RARY OF THE [illegible]

THE OXFORD SURVEY OF THE BRITISH EMPIRE

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BRARY OF THE [illegible] BENGAL LEGISLATIVE

THE OXFORD SURVEY OF THE BRITISH EMPIRE

AMERICA

INCLUDING CANADA, NEWFOUNDLAND THE BRITISH WEST INDIES, AND THE FALKLAND ISLANDS & DEPENDENCIES

With 37 Photographs, 6 Coloured Maps, and 14 Figures in text

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PREFACE

THE object of this series is to furnish a survey of the British Empire and its constituent parts in their geographical and allied aspects, together with their economic, administrative, and social conditions, at the present time. History has not been included as an integral part of the scheme, except for the inclusion of a general historical summary in the General Volume; for the rest, historical references have been included only in so far as they were found desirable for the explanation of existing conditions. The history of the Empire has been brought under review elsewhere, notably in the Oxford *Historical Geography*, edited by Sir Charles Lucas.

The series is in six volumes, and the subject-matter is thus distributed:

I. The British Isles and Mediterranean territories (Gibraltar, Malta, Cyprus).
II. Asiatic territories.
III. African territories (with adjacent islands, Mauritius, &c., St. Helena, Ascension, and Tristan da Cunha).
IV. American territories (with the Falkland Islands and dependencies).
V. Australasian territories (including islands in the Pacific Ocean and the British sector in Antarctica).
VI. General.

The Editors have been in close consultation throughout as to the general plan and details of the work. They have shared between them the arrangements with the contributors, for whose collaboration they express their thanks. Professor Herbertson has undertaken the major part of the work connected with the maps; Mr. Howarth has carried out the greater part of the editorial work in its later stages, has dealt with the illustrations (in the five topographical volumes), and has seen the volumes through the press.

It is desired to acknowledge Mrs. Howarth's collaboration in the work of indexing, and Mr. O. Brilliant's assistance in the compilation of the gazetteer references in the topographical volumes.

Notes in the text enclosed in square brackets are editorial.

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CANADA

INTRODUCTION

THE Dominion of Canada, with an area substantially exceeding three and a half million square miles, comprises the whole of the North American continent north of the United States, with the exceptions of the Atlantic seaboard of Labrador, which belongs to Newfoundland, and Alaska, which belongs to the United States. The Dominion extends through 84° of longitude, its easternmost extremity being in the province of Quebec, on the north shore of the Strait of Belle Isle, and its westernmost boundary being that between the Yukon Territory and Alaska. It is divided from east to west into the following provinces—the Atlantic Maritime Provinces of Nova Scotia, Prince Edward Island, and New Brunswick; Quebec, covering a strip south of the River St. Lawrence and the whole territory north of it to Hudson Strait; Ontario, extending from the Great Lakes northward to Hudson Bay; Manitoba, Saskatchewan, and Alberta, essentially the provinces of the interior continental plain; and British Columbia, the province of the western mountain region or cordillera. Beyond 60° N. lat., northward to the Arctic region, and, so far as concerns the mainland, westward of Hudson Bay, extend territories not organized under provincial government: these are the North-West Territories and Yukon Territory. The international boundary with the United States of America may be traced in the east as a line partly following natural features but partly artificial; it then follows the upper course of the river St. Lawrence and runs through lakes Ontario, Erie, Huron, and Superior, is demarcated mainly by rivers and lakes westward to the Lake of the Woods, and thence to the Pacific Ocean, in Boundary Bay of the Strait of Georgia, follows the line of 49° N. lat.

CHAPTER I

PHYSICAL GEOGRAPHY AND GEOLOGY

By Professor A. P. Coleman

General Introduction

Physical regions.

Dr. George Dawson, many years ago, when Director of the Geological Survey of Canada, divided the country into physical regions, each having certain predominant physical features resulting from the geological history sketched in the following pages. His subdivisions were as follows:

1. The Acadian region, including the Maritime Provinces, south-eastern Quebec, and Newfoundland.
2. The Lowlands of the St. Lawrence valley, including the southern part of Ontario.
3. The Laurentian Plateau.
4. The Interior Continental Plain.
5. The Cordillera.

These regions cover all the well-known parts of Canada—those which are inhabited by white men or crossed by railways—but two other somewhat distinct regions may be recognized, namely, the Lowlands of James and Hudson Bays, and the Great Northern Islands. The additional physical regions suggested are at present of little practical importance, since, except at a few trading posts, their population includes only Indians or Eskimo; but the southern one has possibilities of settlement. Among the names employed by Dr. Dawson, the word 'plateau' used for the Laurentian area is not entirely suitable, since much of the surface included in it lies below 1,000 feet, and large portions round Hudson Bay rise little above sea-level. This greatest of all the regions may better be called the Canadian, Laurentian, or Archaean Shield, following Suess's suggestion below.

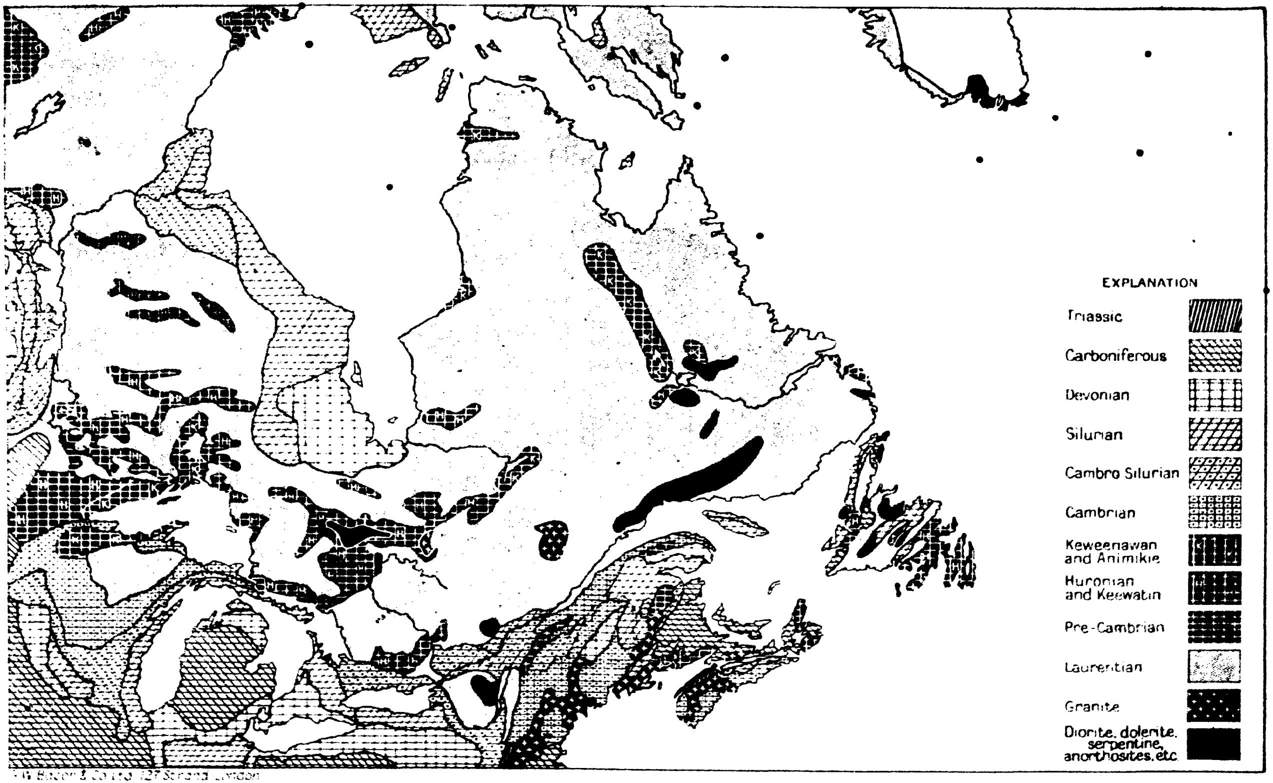

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FIG. 1. Geology of Eastern Canada.

Scope and arrangement of the chapter.

Of the natural divisions just mentioned, the Laurentian Shield far surpasses all the others in extent, covering about 2,000,000 square miles out of the total of 3,600,000 belonging to the Dominion of Canada. From the human point of view, however, it is the least important of all, since even the smallest of the other regions is far more populous and wealthy. This is due partly to its rocky character and the forbidding climate of its northern parts; but as railways are built across its southern end the miner and the farmer are pushing northwards successfully. In the following account of the physical geography and geology of Canada, most attention will naturally be devoted to the better known portions; while the almost uninhabited northern territories of the Dominion, known only from track surveys along canoe routes or from winter travel with dog-trains, will be more briefly sketched. After brief notes on the geological history of the country it will be convenient to begin by describing the south-eastern parts, long known and completely explored, and then to advance to the north and the west where our knowledge is less complete. This will follow also the historical development of the provinces of the Dominion, which began with the open gateway of the Gulf of St. Lawrence and proceeded up the great river to Ontario and the other lakes in succession. As one enters the Gulf of St. Lawrence by ship, following the southern route, the folded Palaeozoic rocks of the Appalachian system show towards the south; and not long after the high and rugged edge of the Archaean Shield rises towards the north as the steamer nears Quebec; while the inland voyage to Montreal affords an introduction to the Lowlands of the St. Lawrence. The historic route thus opens up to the traveller three of the physiographic regions outlined by Dr. Dawson.

Historical introduction.

The central and eastern parts of Canada are geologically of extreme old age, and form probably the largest area of Archaean or pre-Cambrian rocks in the world. While this antiquity is the most striking characteristic of the country, comparatively recent geological events have

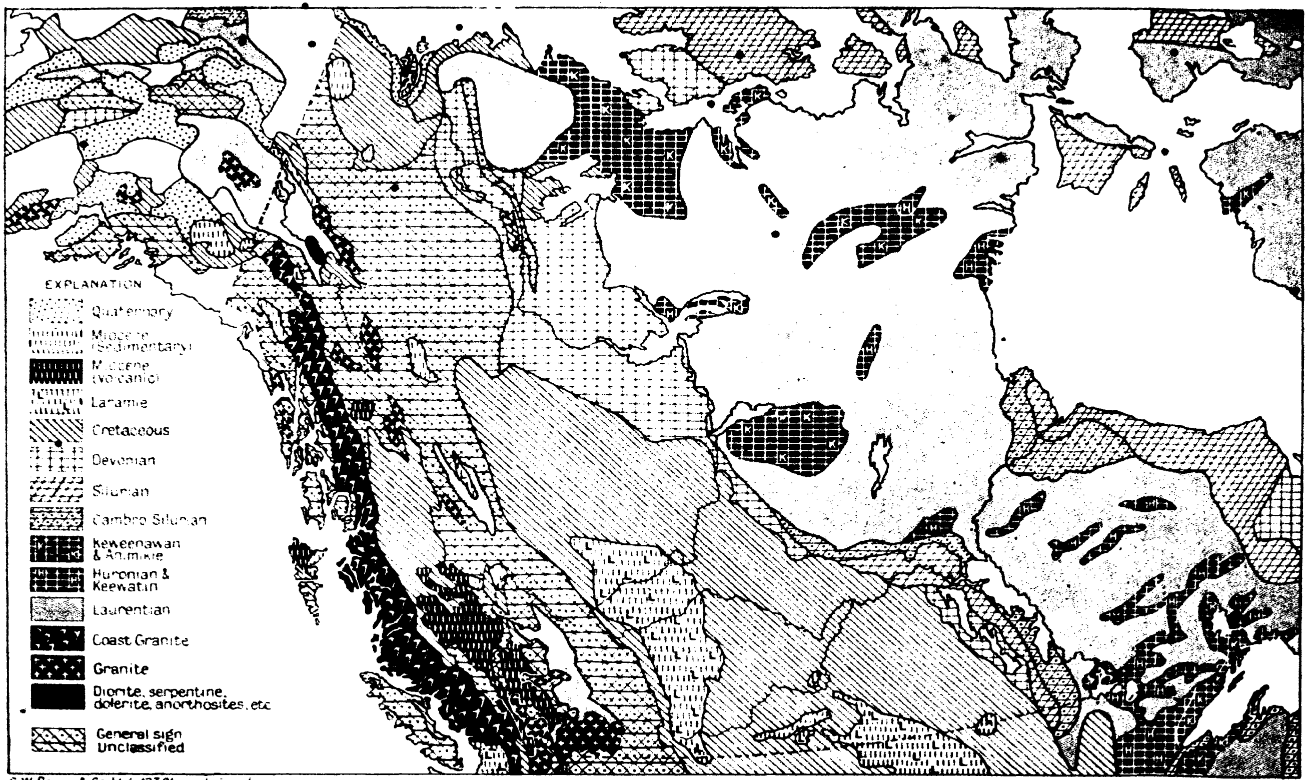

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FIG. 2. Geology of Western Canada.

rejuvenated the region, impressing upon it many of the characters of youth. As a result Canada presents impressive contrasts in geological structure and physical features.

The Canadian Shield.

When Sir William Logan and his assistants began to study the geology of Canada north of the St. Lawrence and the Great Lakes, it was found that the more ancient and crystalline rocks, the nucleus or protaxis about which the rest of the continent was built up, extended northeastwards and north-westwards on each side of James Bay and Hudson Bay; and the American geologist Dana called the Canadian Archaean with its spreading arms a V-formation. Later it became evident that the ancient rocks extended in an irregular belt along the north side of Hudson Bay also. The two ends of the V were thus joined, making a rude triangle, with blunted angles, more than 2,000 miles long from east to west, and 1,500 broad from north to south. The great Viennese geologist, Suess, named this vast area of Archaean rocks *the Canadian Shield*, and the term has been accepted by later writers. Instead of a boss projecting from the centre of the Shield, there is a depression of very old standing, which has long been filled by a shallow sea and is now occupied by Hudson Bay.

Archaean protaxis of the west.

Though this was the main nucleus of the continent, North America did not grow up symmetrically around it as might have been expected, since another Archaean protaxis exists 500 miles south-west of the edge of the Shield, that of the Selkirk and the Gold Range Mountains near the Pacific coast. This is long, narrow, and somewhat interrupted, and runs from south-east to north-west parallel to the western margin of the continent. The débris resulting from the destruction of these mountainous Archaean areas provided much of the material piled up in the shallow sea around: and on their flanks and in the wide trough between them marine Palaeozoic rocks were laid down. Later there were Mesozoic sediments, partly marine and partly freshwater or land formations, deposited upon them, almost completing the outline of Canada and extending far south into the United States.

Growth of the continent about the Shield.

The growth of the continent appears to have been one-sided and not as a uniform aureole about the Shield and the south-western protaxis, since the Palaeozoic and the Mesozoic sediments are entirely lacking along the north-east side on the coast of Labrador. It may be, however, that the slipping down of blocks of the Earth's crust between America and Europe has hidden beneath the Atlantic the evidence of a symmetrical outgrowth from the Shield on this side.

With the growth in area went the upheaval of mountains, first in Archaean times, when apparently the whole surface of the Shield was covered with great mountain chains, next at the end of the Palaeozoic along the south-eastern and south-western sides, and finally at the end of the Mesozoic, when the Rocky Mountains were elevated on the margin of a shallow interior sea.

Outside this area of mountain-building the rocks are surprisingly level and undisturbed even when of great antiquity, and the continent seems to have been very stable, though there have been comparatively gentle risings and sinkings in various parts of its surface.

The physical geography of Canada is rooted in these far-off events, and the structures which they produced, modified and partly covered up during more recent ages, giving the blending of ancient and modern features referred to before as characteristic of the country.

Outline of Canadian geology.

In Great Britain a few hours of travel carry one across an astonishingly complete series of geological formations, so that England provides a compact edition of the history of the world. America is constructed in general on a simpler and broader plan than Europe, so that in Canada it is necessary to cross almost the whole width of the continent to find a fairly complete series of geological formations. Though nearly all the important divisions of geological time have a record in some part of Canada, comparatively few of them have left a marked impression on its geography, and only those of importance in this way need be referred to here.

Archaean rocks: Laurentian. As the Archaean or pre-Cambrian of the Canadian Shield covers more than half the Dominion, the rocks formed in this most distant and obscure of the geological ages are of prime importance and their history should be briefly outlined. The lowest rocks of all are the Laurentian granites and gneisses. The latter, with their banded colours and well-marked cleavage, were once believed to be sedimentary rocks, sandstones and shales laid down on a sea-bottom and afterwards highly metamorphosed. We now know that they are deep-seated eruptive rocks, molten materials that pushed upwards into the cold rocks above, lifting them as domes by their sluggish movement and solidifying slowly at great depths below the surface. These great domes of gneiss and granite are called batholiths, and they form the commonest structure of the Archaean region.

Keewatin. Though the Laurentian rocks underlie all others, they are not the oldest of all, since the Keewatin rocks, which they heaved on their shoulders and into which they sent dikes of granite, must have been cold and solid at that time. The Keewatin[1] also consists chiefly of eruptive rocks, but mainly lava flows and volcanic ash (tuff) now metamorphosed into greenstones and schists. In many places thick deposits of ordinary sediments are associated with them, now changed to gneiss or mica-schist, and also the banded jasper and iron ore of the iron formation.

Grenville series. The Grenville series of the southern Archaean, probably of the same age, contains also much marble or crystalline limestone. During Keewatin times many thousands of feet of lava, ashes, and mud and sand were laid down on a sea-bottom that has utterly vanished. Then came the eruption of the domes of gneiss, lifting the earlier rocks into great mountain ranges. Afterwards these earliest mountains were worn down to stumps, disclosing the foundations of granite and gneiss enclosed in a rude network of Keewatin schist. The process of destruction must have been enormously long and was so complete that only a hilly plain remained when the next formation, the Huronian, began. Many parts of the Shield still have surface-forms outlining these ancient mountains.

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[1] [The middle syllable is sounded as 'way'.]

Huronian.

The Huronian begins remarkably with a great sheet of boulder clay (tillite) formed by wide-spread glaciers, indicating at that early time a climate colder than at the present. Upon the boulder conglomerate water-formed sediments were laid down, now slate or quartzite or limestone. In many places these Huronian rocks still lie nearly flat on the worn surfaces of the older rocks, but in others they too were caught in mountain-building operations and were squeezed and rolled out into schists. Both varieties have left their impress on the scenery.

The Animikie (or uppermost Huronian) is also made up of sediments, very modern in appearance, since they have entirely escaped mountain-building forces.

Keweenawan.

The Canadian Archaean ends with another outburst of volcanic activity in the Keweenawan, when thousands of feet of lava, as well as ash rocks and coarse sandstones and conglomerates, were piled up on various parts of the old continent. These lavas not only influence the surface features greatly, but are important as the source of the ores of silver, nickel, and copper mined on a large scale in northern Ontario.

More than half of Canada owes its arrangement of hills and valleys and watercourses to forms shaped in the Archaean rocks, which have been more or less worked over, however, and sometimes obscured, by later activities.

Palaeozoic.

The Palaeozoic formations are all well represented in Canada, and limestones, shales, and sandstones of its various ages (Cambrian, Ordovician, Silurian, Devonian, and Carboniferous) play important parts in shaping the country, but need no special reference here. In many cases they still lie almost as undisturbed as when they formed the sea-bottom, but in far eastern Canada the Palaeozoic ended with the Appalachian mountain-building period, during which they were crumpled into great folds or torn asunder with profound faults. The Carboniferous of the Atlantic coast is valuable for its important beds of coal, but is barren in the western mountains.

Mesozoic. The earlier parts of the Mesozoic (Triassic, Jurassic) are poorly represented in Canada, but the later part, the Cretaceous, is of extreme importance not only for its extent but also for its economic features. It contains no chalk, but its crumbling sandstones and shales underlie the prairies of western Canada. The climate, when they were formed, was so mild and moist that forests of leafy trees, like those of the present southern United States, covered what are now the bare plains. There were widespread marshes in which the plant tissues were stored, furnishing the beds of coal now mined at many places. The Laramie period, which includes the upper part of the Cretaceous and the lower part of the Eocene, bridges the gap between the Mesozoic or Secondary and the Tertiary, and is of interest especially because the Rocky mountains were elevated then, the latest, and therefore the highest, of the great ranges of Canada.

Tertiary. The continent was now complete so far as its main features were concerned; but during the Tertiary sediments were deposited in several small western basins, and in southern British Columbia there were volcanic eruptions covering thousands of square miles with lava or ashes.

Glacial Period. Towards the end of the Tertiary fossil plants show that the climate was growing colder, and with the Pleistocene or Quaternary began the Glacial Period. It lasted long and was interrupted by at least one inter-glacial period characterized by a warm climate. At its close the surface conditions of the northern part of the continent had been profoundly modified. The vast accumulations of loose materials, due to ages of weathering, were scoured away from the central parts of the glaciated areas, leaving bare rounded surfaces of fresh rock, while nearer the edges of the ice-sheets boulder clay was spread out or long loops of moraine were heaped up, blocking the valleys and transforming the whole system of drainage.

During the thawing of the ice-sheets, another type of work was accomplished modifying the modelling of the surface in many places. The larger Canadian rivers flow north or north-eastward, and when the ice melted from the upper parts of their valleys the lower parts remained blocked. In the resulting glacial lakes sheets of silt or sand were deposited, and now form many thousands of square miles of the most fertile soil in the Dominion.

Under the load of ice, which was in some places two miles in thickness, the land sank some hundreds of feet, leaving thousands of square miles beneath the sea when the ice-sheets began to thaw. The removal of the load allowed the sunken portions of the continent to rise again, exposing wide belts of marine clay on the coastal plains. A large part of Canada owes its rich soil to recent water action in the two ways just mentioned, and all the flattest plains received their final smoothing from the silt thus deposited.

The geologically recent episode of the Ice Age has thus modified the old topography and hydrography of Canada, giving to one of the oldest lands under the sun its singularly youthful aspect.

Regional Description

The Acadian Region.

The Acadian Region includes not only Nova Scotia, New Brunswick, and Prince Edward Island, the original Acadia, but also the mountainous south-eastern side of the province of Quebec. It is essentially maritime, almost all the towns and cities having grown up on harbours, which are numerous and excellent along the greatly indented coasts.

Nova Scotia.

Nova Scotia is the most maritime of all, projecting like a great wharf into the Atlantic, the nearest part of the mainland to Europe except the inhospitable coast of Labrador to the north. As its name suggests, it may be compared to Scotland in various ways, including its geology and physical features. It has Archaean rocks like those of the Scottish Highlands, much folded and pierced by granite masses, and then levelled so that Palaeozoic sediments could be deposited on their truncated edges. Then come anticlines of quartzite and slate of uncertain age, perhaps Cambrian, the gold-bearing rocks of the south-eastern coast. Most important are the Carboniferous sandstones and shales, as in the Lowlands of Scotland, forming shallow basins that dip gently beneath the sea in several places, especially on the north-east coast of Cape Breton Island, where the Sydney mines, the most productive coal-mines of Canada, are worked in places for miles beneath the sea. It is probable that the measures extend beneath the Gulf to Newfoundland where small areas of coal are found. The coal mined in this submarine field is used to smelt the haematite of Bell Island in Newfoundland, likewise mined below the sea, giving rise to the great steel industry of Sydney. A less important coal-field, that of the Joggins along the Bay of Fundy, is classic ground to the geologist through the early works of Lyell and Dawson.

Further to the south-west on the same side of the peninsula are the latest rocks of eastern Canada, a band of red Triassic sandstones flanked by a ridge of basaltic lava. Cape Blomidon, on the basin of the Minas at the north-east end of the basaltic hills, is well known for its fine agates and zeolites.

As in Scotland, much of the surface is rugged and hilly, especially where the disordered mountain structures of the Archaean project, but the hills are nowhere lofty, the highest scarcely reaching 1,400 feet. The coal-measures and other soft rocks make the bottoms of the valleys and are powerfully attacked by the Atlantic storms, so that the coal basins often have a bay eaten into their heart.

Valleys and fiords.

The long strip of Triassic sandstone on the Bay of Fundy side has been hollowed into the beautiful Annapolis valley, almost a continuous orchard under the protection of the North Mountain, the basaltic ridge mentioned above. There are several such smiling valleys eroded from the softer rocks by glacier ice and running water, locally called 'intervales', contrasting strongly with the rough hills on each side. In some cases the carving has gone below the present sea-level, forming 'guts'

PLATE I. SUSSEX VALLEY, NEW BRUNSWICK

(Office of the High Commissioner for Canada)

PLATE II (*a*). VIEW IN PRINCE EDWARD ISLAND

PLATE II (*b*). ST. FRANCIS RIVER, SOUTHERN QUEBEC

(Office of the High Commissioner for Canada)

or fiords, like the Gut of Canso separating Cape Breton Island from the mainland. The beautiful land-locked basin of salt water, Bras d'Or, in the centre of Cape Breton Island, is an expansion of such fiords. The tattered south-eastern fringe of fiordlets and islands is very characteristic of an area of ancient folded rocks broken by eruptive masses and then worked over by ice and the waves of a stormy sea. Though not high, this coast is rugged as compared with the smoother outlines of the more sheltered north-west side.

It has been suggested by Dr. Daly that the southern plateau of Nova Scotia, the higher parts of Cape Breton Island, and the Cobequid Hills running east and west in the narrow stem of the peninsula, are parts of a peneplain formed in Cretaceous times and then elevated and dissected. Fragments of a lower plain mainly of Carboniferous rocks are left along the Northumberland Strait and the Bay of Fundy, in the latter case scoured by the most powerful tides in the world. On the basin of the Minas and at other places these tides sweep vast quantities of red mud into the marshes, which have been diked, holding the mud to make rich hay meadows.

New Brunswick.

New Brunswick on the other side of the Bay of Fundy presents similar rocks and surface features, but rising to somewhat greater heights. In the northernmost part of the province Palaeozoic beds cut by felsites and other eruptive rocks were caught in the Appalachian revolution and form mountains often of more than 2,000 feet high, Mount Carlton reaching 2,716 feet. Their summits are rounded and densely wooded.

A triangular area of Carboniferous and Permian shales and sandstones between the hills to the south-east and those to the north-west escaped the mountain-building forces, however, and still lies flat and unfolded along the Gulf of St. Lawrence. This, with Prince Edward Island a few miles away across the Strait of Northumberland and Anticosti Island where the gulf narrows to the St. Lawrence, formed a block of the earth's crust which rested undisturbed through all the turmoil around, although

Newfoundland on the other side was powerfully affected by the Appalachian folding and faulting. New Brunswick has a large area of Carboniferous rocks in this lowland portion, far more than Nova Scotia, but only poorly supplied with coal; for the thin seams that are mined scarcely supply the local needs.

Prince Edward and other islands.

The province of Prince Edward Island, the smallest in the Dominion, is also the least varied in its physical features. Its red Permian beds rise as gently rounded hills of rich soil bounded by low shore cliffs facing a somewhat sheltered sea. Along its concave northern shore the waves of the gulf have built long sand-bars across the mouths of bays and inlets, smoothing out the gentle crescent of the island. There are similar bars along the coast of New Brunswick to the west, and still more perfect spits and sand-bars tie together the remnants of crumbling Carboniferous rocks of the tiny Magdalen Islands out in mid-gulf fifty miles north of the east end of Prince Edward Island. These islands are unique in eastern Canada in having escaped the work of glaciers during the Ice Age. The continental ice-sheets failed to reach them. Sable Island, 'the graveyard of ships,' a mere sand-bar a hundred miles out in the Atlantic south-east of Nova Scotia, should be mentioned also. It presents no solid rock of any kind and is constantly in process of being destroyed and rebuilt by the waves.

South-eastern Quebec.

The mountainous north-western part of New Brunswick joins the Shickshock or Notre Dame Mountains of south-eastern Quebec, which are continuous with the Green and White Mountains of New England, parts of the Appalachian Chain. This portion of the Acadian region is of old Palaeozoic rocks greatly crumpled and folded, and in many places penetrated by eruptives. Once parts of a great range, the Notre Dame Mountains, are now comparatively low and have rounded summits, seldom attaining more than 3,000 feet, though Mount Logan near Matane reaches 3,708 feet. This mountainous belt extends for five hundred miles from the Vermont boundary to Gaspé, and there are no undisturbed areas of flat sedimentary rocks like those of the maritime provinces; but Anticosti Island, only forty miles from Gaspé, though formed of the same Ordovician and Silurian rocks and directly in line of strike of the mountains, has remained unaffected. Its low and flat surface is often hidden by the fogs of the gulf.

Gaspé Peninsula, between the St. Lawrence and Chaleur Bay, is a bold promontory rising with steep shores picturesquely carved by the waves towards the east where the island of Roche Pereé, pierced by a tunnel at sea-level, rises near the village of Gaspé. On the St. Lawrence side the shore is almost without indentations, and the little fishing villages are built on small alluvial fans at the mouths of rivers. There is so little soil that the central parts are almost uninhabited except towards the New England end, where beautiful lakes and wooded mountains make attractive holiday resorts. The south-western part includes a belt of serpentine containing the asbestos deposits for which the province of Quebec is celebrated, supplying more than three-quarters of the world's demand for this mineral textile.

Lowlands of the St. Lawrence: Quebec–Ontario.

The Lowlands of the St. Lawrence valley begin near the historic city of Quebec and extend south-west to the Detroit River, a distance of 660 miles. From Quebec to Montreal they lie between the mountains just described on the south-east and the Laurentian Highlands on the north-west. Beyond this the St. Lawrence River and the Great Lakes are the southern boundary so far as Canada is concerned, but the plain of nearly horizontal Palaeozoic strata extends hundreds of miles south-west in the United States. The northern boundary here is partly the irregular edge of the Palaeozoic against the Archaean and partly the waters of Georgian Bay and Lake Huron.

In the Thousand Islands region, where the St. Lawrence widens out into Lake Ontario, the belt of Palaeozoic rocks is interrupted for a short distance by outcrops of the Laurentian, joining the main Archaean shield with the large outlier of the Adirondack Mountains in the State of New York.

The area of the Lowlands of the St. Lawrence valley is estimated at about 35,000 square miles, of which 11,400 belong to the north-eastern division between Quebec and the Thousand Islands; 9,700 to the lowlands between Kingston and the Niagara escarpment, and 14,200 to the triangular area between the escarpment and the lakes Erie and Huron.

The rocks of these lowlands are mainly shales and limestones, providing soils of good quality. In Quebec they end abruptly against a wall of Archaean to the north, the Palaeozoic floor having slipped down along a great fault plane; but in Ontario the ancient hilly surface of the Laurentian dipped gently southwards, and some of the higher hills, which rose as islands through the encroaching Palaeozoic sea, still project island-like through the thin edge of Ordovician limestone. Generally, however, these lowlands have been so buried under Pleistocene drift that bed-rock is hard to find except along the lakes and rivers.

Volcanic hills: Pleistocene water-levels.

The Silurian limestones at Montreal were pierced by an old volcano whose neck of nepheline syenite rises as Mount Royal 700 feet above the plain, giving a magnificent view of the city and the lowlands cut by the St. Lawrence and the Ottawa rivers. From Mount Royal half a dozen other volcanic hills may be seen at different distances towards the east. These Monteregian hills, as they have been named by Dr. Adams, represent the last volcanic activity known in central Canada, and vary most picturesquely the gentle scenery of the lowlands. From the top of Mount Royal the mountainous edge of the Laurentian plateau, bounding the level plain, can be seen in the distance towards the north-east. The mountain serves also as an excellent nilometer for the Pleistocene water-levels, whose terraces on its flanks range from 50 to 600 feet above the sea. Similar terraces with marine shells may be observed all the way up the St. Lawrence, affording evidence that the sea occupied the low flat valley before the land began to rise at the close of the Ice Age; and the plain of marine sand and clay, charged with shells and bones of whales and porpoises, extends south-west into Ontario as far as the Thousand Islands, though the shore lines become lower and less distinct. In the Thousand Islands the highest marine level is only 350 feet above the sea, sufficient, however, to flood the Ontario basin, with its elevation of 246 feet. Some thousands of years ago what is now Lake Ontario was an extension of the Gulf of St. Lawrence, and it is possible that Indian canoes voyaged from Quebec to Niagara Falls without a portage.

Lake Ontario.

After a short interruption of low Archaean hills at the Thousand Islands, flat limestones and shales of Ordovician age extend from Kingston at the outlet of Lake Ontario to the Niagara escarpment near the west end of the lake; but the rolling surface of boulder clay left by the Labrador ice-sheet completely hides the solid rock, except where cut away by river action or by waves on the shores of lakes. Occasionally the till-covered plain is varied by tumultuous morainic hills with a stony surface or by sandy and gravelly kames rising 700 feet or more above Lake Ontario. Round the Ontario basin the shore of glacial Lake Iroquois forms a prominent feature. Its wave-cut cliffs and gravel bars can be followed almost as plainly as those of the present lake. The old shore has been deformed, like the marine beaches, by unequal elevation. At Hamilton towards the west it stands 115 feet above Lake Ontario, while at the north-eastern end it is 500 feet above it. This difference of nearly 400 feet makes it clear why Lake Ontario, once below sea-level, was cut off from the St. Lawrence by the warping of its outlet at the Thousand Islands. The Iroquois shore plays an important rôle in the life of Ontario, supplying convenient routes for roads and railways, sites for cities such as Toronto and Hamilton, and the loamy and silty soil needed for one of the best fruit-growing regions of Canada, well known for its apples, grapes, and peaches.

The somewhat varied plain just described, lying around Lake Ontario and towards Georgian Bay, ends towards the west and south at the foot of an escarpment of Silurian rocks consisting of soft shale at the bottom and more resistant limestone on the top. The shale has been eaten back along a base of limestone dipping gently southwest or on the old Archaean land-surface, so that a cliff faces the lowlands. The escarpment rises commonly 200 to 400 feet above the plain at its foot, and 600 or 800 feet above the sea. The highest point of the triangular scarp- or table-land reaches 1,700 feet, and since the cliff is capped with Niagara limestone it is naturally called the Niagara escarpment. It may be followed westwards from the Niagara gorge to Hamilton and then north to the western side of Georgian Bay, beyond which the Manitoulin Islands of northern Lake Huron represent a continuation towards the north-west. Locally the cliff is called the ' mountain '.

Niagara Falls.

The escarpment is the occasion for many waterfalls, the most famous being the Niagara Falls, which have a clear plunge of 160 feet and a total descent, including rapids above and below the falls, of 326 feet in the 26 miles between Lake Erie and Lake Ontario. This great fall supplies electric power for Toronto, 90 miles away round the head of Lake Ontario, and for several other cities within a radius of 160 miles.

Westward from the Niagara escarpment the Silurian and Devonian rocks are generally covered with boulder clay and moraines, or with the silts of the ice-dammed Lake Algonquin, which included the combined areas of lakes Superior, Huron, and Michigan, and lasted or thousands of years. The basins of the upper lakes once drained through Georgian Bay into Lake Ontario, but this outlet was blocked by hundreds of feet of boulder clay and morainic materials during the Ice Age, sending the outflow around by Niagara and thus inaugurating the present chain of inland seas connected by short stretches of river.

Physical conditions and human settlement.

The human history of eastern Canada was largely determined by these comparatively recent geological events, which provided drift-covered plains for the farmer and fruit-grower, easy gradients for the railways, great

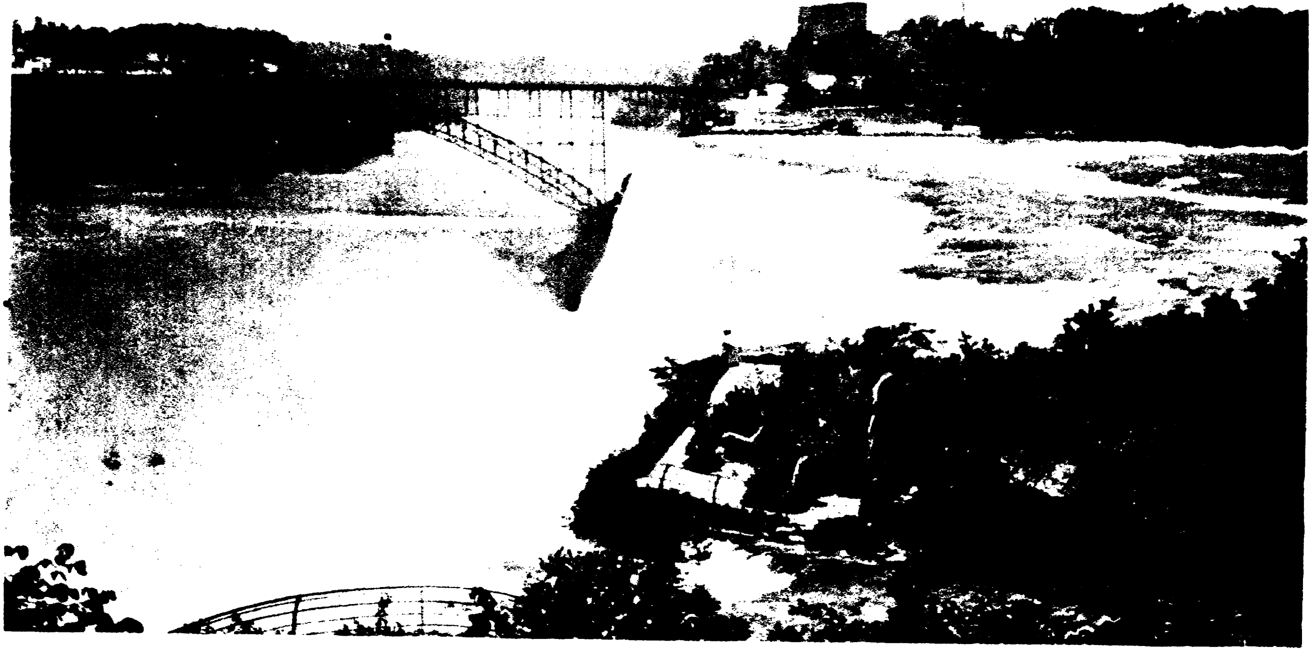

PLATE III. NIAGARA FALLS

(Office of the High Commissioner for Canada)

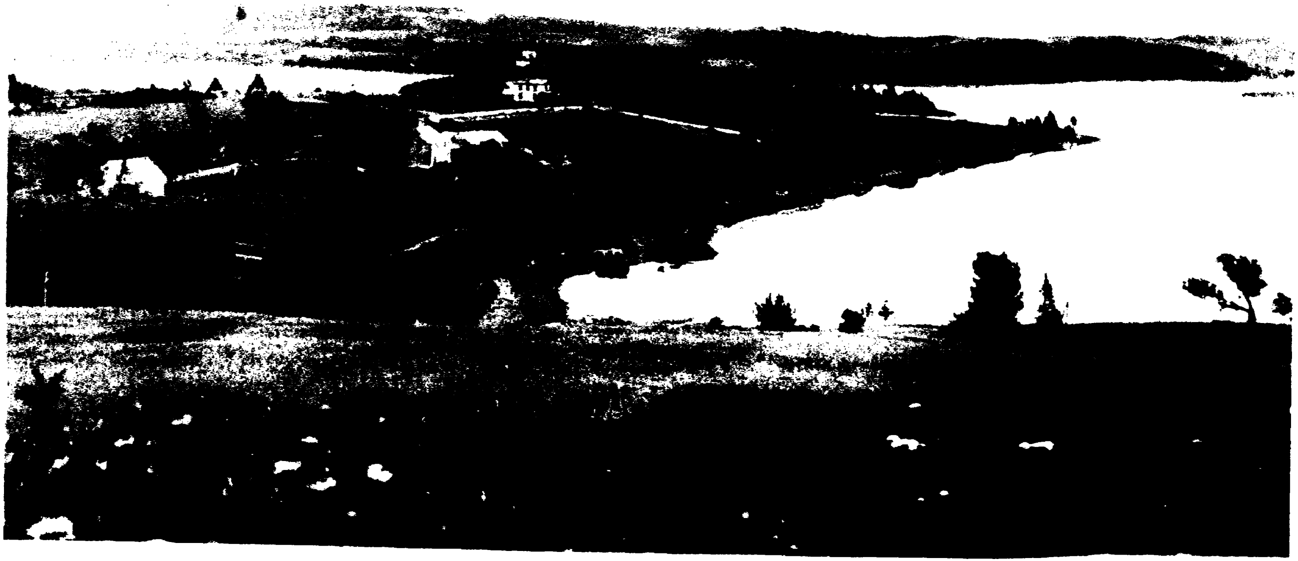

PLATE IV. BELMONT, NEAR GUYSBORO, NOVA SCOTIA

(Office of the High Commissioner for Canada)

stretches of navigable water over lakes and rivers, and abundant water-falls to supply power for the manufacturer. The settlements of the white man naturally followed inland the pathway of the St. Lawrence valley and spread out over the rich farm-lands round the Great Lakes. It is not surprising, therefore, that the Lowlands of the St. Lawrence support on their 35,000 square miles of territory 4,000,000 out of the 7,300,000 inhabitants of the Dominion. They may be compared in density of population with several of the countries of Europe, while the rest of Canada averages only one inhabitant per square mile. The relatively mild climate of the most southern region of Canada is, of course, an important factor in drawing population, in addition to the physical features and the ease of access from the Old World referred to above.

The Archaean Shield

General description.

North of the fringe of Palaeozoic rocks of the St. Lawrence valley the vast Archaean Shield stretches through twenty degrees of latitude to the Arctic Circle, and in places four or five degrees beyond it. Parts of this area were once covered with Silurian rocks, as shown by outliers of limestone in unusually deep hollows of the old surface in the basins of Lake Nipissing and Lake Temiskaming; but generally these later sediments have been stripped off, disclosing the original surface scarcely changed. The greater part of the region consists of monotonous grey gneiss streaked with large or small bands or inclusions of dark-green hornblendic rocks, or penetrated by dikes and larger areas of pink granite. The gneiss and granite commonly rise as batholiths through the more ancient rocks, chiefly the lavas and volcanic ashes of the Keewatin, now transformed into green schists which sweep as broad meshes about the batholiths. The jasper banded with haematite or magnetite of the iron formation in many places has similar relations to the gneiss and granite, and in certain southern parts marble or crystalline limestone with other sedimentary rocks has been squeezed in as synclines between the batholiths, forming curved bands of much the same kind. The arrangement discloses the ground-plan of great mountain ranges created, and also destroyed, before the early Huronian glaciers laid down their boulder clay and the Huronian sea deposited the sand and clay, now turned to quartzite and slate. The Huronian rocks were in turn folded into mountain chains, which have vanished, and in places all of these older rocks were covered with Animikie sediments and Keweenawan lavas, which have since undergone little change.

Surface forms.

Each of these formations presents characteristic surface-forms in the wide peneplain to which the mountain chains have been reduced. There are rounded domes, long ridges, irregularly shaped hills and valleys, even vertical cliffs, but none of the elevations rises far above the general level, and from a hill-top it can be seen that all the other hills, no matter what their shapes, reach about the same height, so that the horizon line is strikingly uniform. The original peneplain, however, has been raised to different heights in different parts, with slight tilts in more than one direction, inaugurating a new cycle of erosion which is now actively cutting down valleys and increasing the relief of this monotonous territory. Though there is a constant succession of hill and valley, the down-cutting of streams has seldom made a difference of level amounting to more than a few hundred feet, and actual mountains are confined to a few marginal portions of the great Shield. The structural forms of the different rocks as modified by erosion may often be recognized from a distance. Hard eruptives, such as granite, diabase, or greenstone, rise as domes, commonly making the highest summits. The various schists generally have a strike of 60° or 80° east of north with a steep dip, and where they predominate all the physical features stretch out in that direction, ranges of hills, river valleys, and lakes all taking their shape from the cleavage. In some places the jasper iron ranges stand up as long ridges, and usually slates and limestones have been worn down to valleys or lake basins. In Huronian districts massive beds of quartzite may form prominent features, since they are more resistant than other rocks, and rise as white, greenish, or brownish hills like the Cloche Mountains, which stand 800 or 900 feet above Lake Huron and extend 30 miles. So great an elevation, however, is quite exceptional. There are districts where the joints of the rocks have determined the forms of hills and valleys.

Effects of the Glacial period.

After the complex of ancient rocks became exposed as a dry land-surface during the early Palaeozoic, there must have been enormous decay, but the accumulations thus made were swept away so completely in the Ice Age that over many thousand square miles the rock surfaces are fresh. The ice-sheets left their impression on the region in other interesting ways. Where the bed-rocks were unequally hard the surface was scoured and planed into *moutonnées* forms, the hills having rounded sides facing the direction from which the ice came, and more rugged shapes or piles of loose blocks on the lee side. With these significant forms, often helped out by grooves or striae, directions for travel can be determined without a compass in cloudy weather. From the two great radiant centres of the Labrador and Keewatin ice-sheets east and west of Hudson Bay, the drift materials were swept outwards, leaving bare surfaces of rock with boulder clay behind the hills or in the deeper valleys; but towards the margins of glacial action more and more boulder clay was deposited, covering the rock over extensive areas, and moraines were heaped up, greatly modifying the Archaean topography.

During the final retreat of the ice as the milder climate became effective, similar moraines were left here and there over the previously scoured surface of rock, and perched blocks, sometimes as large as a cottage, were dropped on hill-tops to vary the sky-line. Here and there, near the moraines, but on their inner side, long narrow esker ridges of sand and gravel show where rivers once wound their way, carrying off the drainage from beneath the ice. Towards the later stages of the waning ice-sheets lakes followed up the ice-front in many places, often quite ephemeral bodies of water, by no means as long-lived or efficient as Lakes Iroquois or Algonquin farther south; though one of them, Lake Ojibway, between the watershed of the Great Lakes and the stagnant ice of James Bay, was as large as Lake Superior. On its bed were spread out the great deposits of stratified sand and clay of the 'clay belt', now being opened up to settlement by two transcontinental railways. The work of these lakes during the retreat of the ice has provided almost the only extensive tracts of level soil which cover the rocks of the Archaean Shield, and is of great importance from the human point of view.

Lakes of the Archaean Shield.

It is probable that the pre-glacial mantle of residual materials was well drained by long-established rivers, and that lakes were rare or absent; but the work of the ice completely changed these conditions by blocking all the valleys with drift. What had been a well-drained surface of soil was left as bald hills of rock with innumerable basins between. The result was the formation of the most extensive lake region in the world, like that of Scotland, Scandinavia, and Finland in Europe, but on an immensely larger scale as to size and number of the bodies of water. The complicated surface-forms resulting from the wearing down of the unequally resisting rocks of the Archaean mountain-systems have combined with the damming of tens of thousands of depressions to produce the numberless lakes of northern Canada. Except where covered with marine silts or those of glacial lakes like Ojibway, the whole region consists of rocky hills separated by sheets of water of every size, from ponds in the woods to inland seas fifty or a hundred or several hundred miles in length. As might be expected from their origin, these lakes have an endless variety of shapes. They are simply parts of an old irregular surface flooded to a given depth, and they present all the complications of outline due to the wearing away of steeply tilted schists cut by dikes and bosses of eruptive rocks. Islands and bays and inlets and narrows often form a labyrinth of waters most puzzling to the explorer. Some of the larger sheets of water, like Lake-of-the-Woods, contain thousands of islands separated by wide or narrow channels, the larger islands having lakelets with islets of their own. These irregular basins often spill over some barrier of solid rock or of boulders into other basins, with no definite river as a connecting link, and the drainage follows the most devious channels, here with the thunder of falls, there with the roar and white water of rapids, but in many places through the still and deep passages between walls or slopes of rock. Usually the rivers have scarcely made a beginning of cutting away obstacles and grading their accidental beds.

Water-ways and scenery.

As might be expected from their haphazard formation, the lakes vary greatly in depth, some having hundreds of feet of clear water, while others are muddy shallows largely silted up by some inflowing stream. The smaller and shallower lakes present every stage from clean open rock-walled waters to marshes or 'muskegs'; beginning with reedy margins, going on to broad rims of peat bog round a dark pool in the centre, and ending in a wide flat of quaking green sphagnum covering many feet of black muck. With so undeveloped a drainage system there are naturally in places hundreds of square miles of muskeg or peat bog, especially in the more gently sloping and stagnant parts round James and Hudson Bays. Canoe routes can be followed in almost any direction for hundreds of miles across the 'rocky lake' type of country so prevalent on the Archaean Shield. A canoe may be launched on the north shore of Lakes Huron or Superior, or from some little railway station beyond Lake Superior, and worked north or west to Hudson Bay or Lake Winnipeg, with few portages of more than a mile or two, often for many miles with nothing more than a 'drop over' from one water-level to another. Most of the map of northern Canada has been constructed from surveys made from such canoe routes, and summer travel over thousands of miles to the north of the railways is still carried on by the methods devised by the Indian. The scenery is pretty on the small scale, the combinations of woods, rocks, and water having infinite variety, and occasionally on the larger lakes there are fine cliffs and distant views ; but after days of travel, when all varieties of the landscape have become familiar, the constant succession of low cliffs of granite or green schist crowned with evergreen trees and reflected in calm waters may grow monotonous, while tracts that have been swept by the too frequent forest fires may be distinctly ugly. As one goes northwards the tree-growth diminishes until the timber-line is reached at the 'barren grounds', including the north-west part of Ungava and the north-east part of Keewatin, near the northern shores of Hudson Bay. From this to the Arctic Ocean rock is more continuously exposed, though in many places the term 'barren grounds' is not appropriate, and there is good soil with a rich growth of shrubby and herbaceous plants, pasture for great herds of caribou and musk oxen.

Margins of the Shield.

As described above, the 2,000,000 square miles of the Archaean Shield have in general the character of a somewhat accidented plain, with few residual summits rising above the general level and no striking mountains. Not far from a fourth of the surface is covered with water, draining in most cases towards the central basin of Hudson and James Bays, following the usual slight inward tilt of the plain. Its outward margin is often considerably elevated, and towards the north-east and the south-east there is a rugged descent of 2,000 or 3,000 feet, with nearly vertical cliffs towards the Atlantic and the St. Lawrence valley. The margin along the Labrador coast is strikingly abrupt, as if an eastern continuation of the Shield had disappeared by the slipping down of vast blocks now forming the sea-bottom ; and the same is true in almost an equal degree along the north-west shore of the Gulf of St. Lawrence. Nearly the whole Palaeozoic margin has been faulted down along this coast, only a remnant of it remaining near the Strait of Belle Isle. At the city of Quebec the fault-plane is clearly seen between the lower and the upper town, the Ordovician slates having slipped down along the face of the cliff.

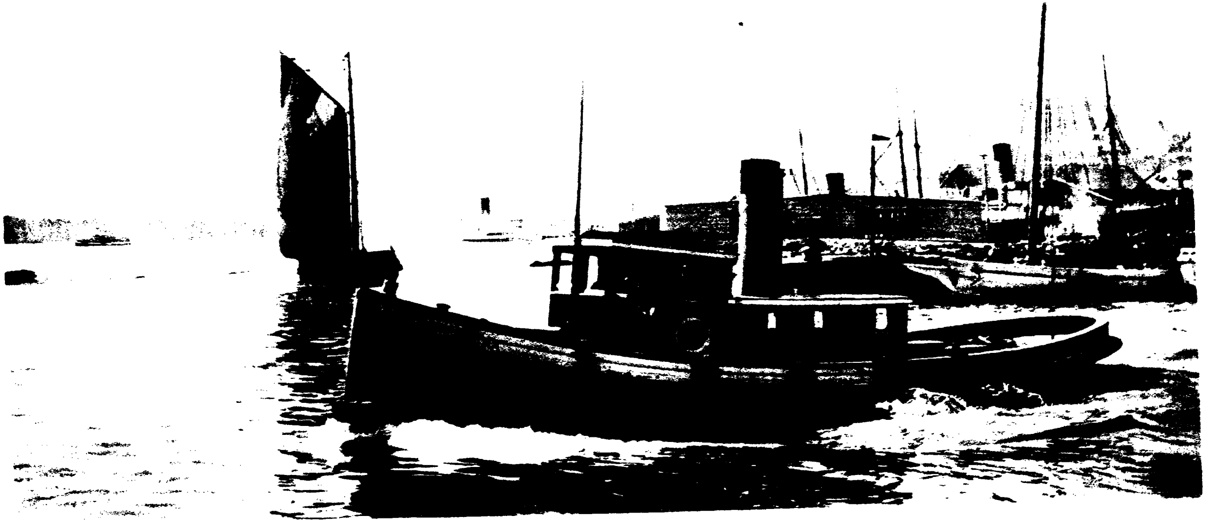

PLATE V. QUEBEC: ST. LAWRENCE RIVER
(Office of the High Commissioner for Canada)

PLATE VI. PAPINEAU FALLS, BATHURST, NEW BRUNSWICK

(Office of the High Commissioner for Canada)

The splendid cliffs of Archaean rock rising from 500 to 1,000 feet along the north shore of Lake Superior suggest similar faulting, but in most parts of Ontario, and also in Manitoba and northwards, the margin is much lower and dips gently eastwards beneath the Palaeozoic sediments, the slope being from 25 or 50 feet to the mile.

The greater part of the Archaean Shield is less than 1,000 feet above sea-level, though there are considerable areas reaching from 1,500 to 2,000 feet, and at a few points along the south-eastern and north-eastern margins there are respectable mountains, which will be mentioned later.

Thus far the description of the central territory of Canada has been general; but in an area so vast there is, of course, more or less local variation, and a more special account of its main divisions is desirable.

The Archaean of Ontario.

The best known part of the Archaean Shield is naturally that which adjoins the populous lowlands to the south, and the discovery of mines in the Archaean of Ontario has directed special attention to that region, some parts of which have been carefully mapped. The band of Archaean between Ottawa and Georgian Bay, studied by our earliest geologists, differs from most other parts in the prevalence of limestones and marbles of the Grenville series, which run as long synclinal bands between batholiths of granite and gneiss, and have left a marked impression on the physical features of the region. These easily crumbling rocks naturally occupy the river valleys and lake basins, and form the fertile land occupied by farms, while the more resistant rocks rise as hills. In some places the marble is associated with graphite, mica, and talc, which are mined; and also with nepheline and other syenites so rich in corundum as to be the chief source of that abrasive in America.

Further north a broad belt of Huronian rocks extends north-east of Lake Huron, with a length of 200 miles, consisting of greywacke conglomerate, slate, and quartzite, which largely determine the physical features of the country. These rocks are sometimes steeply tilted, the harder layers making sharp ridges, while at others they are only slightly inclined and give gentler land-forms.

The curiously straight direction of the rivers and lakes in this part of Canada immediately strikes the eye on the map, but it is often hard to account for, since the original rock structures run with a good deal of uniformity towards the north-east. The straight lines of depression crossing the general strike have been rather doubtfully explained by the weathering out of dykes or the arrangement of fault-planes or of jointage.

In places the Huronian sediments have been disturbed by sheets of basic eruptive rocks, such as norite and diabase, which have brought with them various metals, thus giving rise to great mining industries. The basin-shaped sheet of norite near Sudbury, 37 miles long and 16 wide, is surrounded by large and small nickel deposits which settled into the hollows beneath while the rock was still molten. This sheet of rock (micropegmatite above and norite below) supplies two-thirds of the world's nickel. From the geographical aspect it has produced very interesting surface forms. Outside the basin is found the hummocky country characteristic of most Archaean regions, but the easily weathered outer edge of the nickel eruptive has been carved into valleys often filled with a narrow lake, while its inner edge of granite forms an oval ring of rough hills. The soft Upper Huronian tuff and slate thus enclosed have been levelled to a flat valley occupied by farms. The contrast is notable where the main line of the Canadian Pacific Railway laboriously climbs the outer wall of hills, speeds across the level valley, and then climbs out again between the cliffs near Onaping river.

Cobalt mineral region.

In the Cobalt region, 90 miles north-east of Sudbury, a few square miles of Huronian conglomerate, resting discordantly on Keewatin greenstones and penetrated by a great sill of diabase, supply the richest silver ores in the world, and more than meet the world's demand for cobalt. The hilly streets of the picturesquely ugly town of Cobalt show the cliffs and ridges resulting from the slow stripping of the Lower Huronian boulder clay from the ancient land surface of the Keewatin. Not far to the east is the remarkable trough of Lake Temiskaming, like an inland fiord; straight, deep, and of great age, as shown by the Silurian limestone still filling its upper end, but unknown elsewhere in this part of northern Ontario.

A hundred miles north-west of Cobalt are the important gold deposits of Porcupine, situated mostly in Keewatin rocks forming the usual bare hummocky hills, while the lower ground is largely covered with lake deposits.

Cobalt is south of the watershed between the St. Lawrence waters and Hudson Bay, while Porcupine is on the northward slope. In both districts there are wide areas of lake deposits, formed in bays of Lake Algonquin to the south and in the shallower waters of Lake Ojibway to the north. In the latter case the silts and stratified sand and clay are estimated to provide 16,000,000 acres of soil rendered fertile by the erosion of the shales and limestone of James Bay. The National Transcontinental and Canadian Northern railway lines follow this belt of level land for hundreds of miles.

Lake Superior.

Turning westwards from the Georgian Bay with its 30,000 islands of Archaean rock facing the Silurian escarpment of south-western Ontario and of Manitoulin Islands, the Sault Ste Marie is reached, and beyond it Lake Superior, which lies almost wholly in the pre-Cambrian rocks. Its immediate shore often consists of the latest rocks of this age, the Animikie and Keweenawan, which dip inwards from all sides, forming a synclinal basin with a greater axis more than 400 miles long, bent obtusely northward in the middle. As the Keweenawan rocks on its edge are predominantly lavas, the basin may have been formed by collapse when the molten material ascended from beneath the bottom of the lake. Its waters stand 601 feet above the sea, and its greatest depth is about 1,000 feet ; so that its bottom goes about 400 feet below sea-level, although the lake is 600 miles from tide water. Why so ancient a basin was not long ago filled is not easily explained, but its watershed is very small, the divide towards Hudson Bay being at one point only

21 miles from its shore, so that rivers entering Lake Superior are short and carry little detritus. Keweenawan diabase sheets, sometimes 300 feet thick and lying with only a gentle dip, cap nearly all the hills towards the north-west of the lake near Port Arthur and Fort William. The resulting table mountains sometimes rise 1,000 or 1,300 feet above the lake, as at Thunder Cape and Mount McKay, and the cliffs of vertical columns make striking scenery.

The Keweenawan is lacking, however, for some distance on the north-east shore of Lake Superior, which consists mainly of Laurentian gneiss and Keewatin rocks containing valuable iron mines. This part of the shore rises from 800 to 1,200 feet within the first two or three miles, so that all the rivers flowing towards the lake tumble over in fine waterfalls; and the highest point in Ontario, Tip Top Hill, reaches 2,100 feet above the sea a few miles inland. This wild coast is uninhabited except for a mining camp and a few little fishing stations, and is seldom visited by the tourist.

Lake Nipigon, 30 miles north of Lake Superior and 250 feet higher, may probably be called the first of the Great Lakes, though it is only 70 miles by 50 in dimensions. Keweenawan diabase forms much of the shore and occurs in islands, so that this basin probably had a similar origin to that of Lake Superior.

Formation of the Great Lakes.

The chain of Great Lakes seems very accidental. The two upper basins are due to synclinal depressions; the combined Lakes Huron and Michigan owe most of their depth to filling in, during the Ice Age, of a former channel between Georgian Bay and Lake Ontario; while Lakes Erie and Ontario have been formed in post-glacial times mainly by the upward tilt of the land towards the north-east, which is known to amount to at least 700 feet. If the tilting process should continue for another 50 feet, the Upper Lakes would flow south past Chicago into the Mississippi. Considering such recent tippings and dammings of the basins the equilibrium of the system seems far from stable.

To the north-west of Lake Superior the Archaean rocky lake country continues with the usual features into Manitoba and to the shore of Lake Winnipeg.

The Archaean of Quebec.

The geology and physical features of the Archaean of Quebec are very like those of northern Ontario. Crossing the Ottawa River, the batholiths of gneiss enclosed by bands of Grenville limestone so characteristic of eastern Ontario are repeated along Gatineau river and north of Montreal, but the mountainous and rugged edge of the Shield overlooking the lowlands of the St. Lawrence is loftier and more inhospitable than any portion of Ontario except part of the shore of Lake Superior. Many summits rise more than 3,000 feet above the gulf. All the larger rivers flowing towards the St. Lawrence have many waterfalls and rapids in their headlong descent from the interior, often valuable sources of power for saw-mills or paper-mills, and their lower end sometimes occupies a canyon-like valley of great age, perhaps pre-Palaeozoic. The best known and the most impressive is the fiord of the Saguenay, floored with salt water and with walls reaching in places 1,700 or 1,800 feet. Its waters are deeper than those of the St. Lawrence at its outlet.

The ore deposits so important in Ontario seem to be lacking in Quebec, and there are fewer old lake deposits to furnish farm-lands, though round Lake St. John at the head of the Saguenay a settlement has grown up. The larger Lake Mistassini, 140 miles to the north-west, presents no civilization except a Hudson's Bay post. It is 1,200 feet above the sea, is surrounded with late pre-Cambrian limestones, and is walled in on each side by ridges of older rocks rising 300 to 500 feet above it.

Ungava (northern Quebec.)

The northern part of the great peninsula of Ungava or Labrador has been little explored, though it has been crossed in a few places by survey parties. For nearly 300 miles through its centre, according to Mr. Low of the Canadian Geological Survey, there extends a band of late pre-Cambrian rocks like the Lake Superior Animikie, which may be important in the future because of large deposits of rather low-grade iron-ore.

The coasts.

Round the coasts this part of the Shield is better known. Along the Atlantic the shore generally rises steeply and has been greatly dissected, forming a fringe of rocky peninsulas and islands separated by narrow channels or 'tickles'. There are many fiords running in among the hills, the greatest being Hamilton Inlet, which recalls the Saguenay, though on a larger scale. It runs for 150 miles inland and is followed by a definite river valley sunk from 500 to 800 feet below the general level for another hundred miles. This valley ends up-stream in a wild canyon, where the river descends from 1,660 feet to 900 feet above the sea in a succession of rapids and falls, including one sheer descent of 302 feet. Above this the river has no definite channel, but consists merely of spillways between sprawling lakes of the interior tableland. The contrast is described by Mr. Low as striking. There are many other river valleys and fiords of a similar kind on the Atlantic coast, but on a smaller scale. At some points along the shore great sheets of diabase, somewhat like the Keweenawan sills near Lake Superior, but larger, provide vertical cliffs and tabular mountain tops, while at the foot of the cliffs the ancient surface of the contorted gneiss may be seen.

The interior tableland.

The interior tableland loses its peneplain character and rises into the Torngat Mountains in the Nakvak Peninsula between Ungava Bay and the Atlantic. According to Dr. Daly, they present rugged peaks of schist and gneiss instead of the usual rounded forms of the residual hills in the rest of the Archaean Shield. Their lower parts are glaciated, but their summits seem to have risen as nunataks above the continental ice-sheet. The highest point ascended reached 4,400 feet, but others to the south were estimated at 6,000 or even 7,500 feet, making them the highest peaks in eastern North America.

North-west of the central tableland of Labrador the surface retains the 'rocky lake' character, though it sinks greatly. The Koksoak River and its tributaries, which interlock with those of Hamilton River, wander from lake to lake on the tableland and then descend to the lower levels before entering Ungava Bay. Summit lake, according to Low, divides its waters between Koksoak River flowing into Ungava Bay and Manicouagan River, which reaches the Gulf of St. Lawrence, illustrating the youthful and accidental character of the hydrography. Though the interior of Labrador has a quarter of its surface covered with lakes, there is a low-lying belt 100 miles wide nearly devoid of lakes on its westward side towards James Bay. This is due to the marine sands and clays which reach inland to a height of 400 feet above the sea. There are marine terraces at similar levels along the Atlantic and gulf coasts also. North of James Bay along the coast of Hudson Bay the shores become steeper and are fringed with late pre-Cambrian iron-bearing rocks and sheets of diabase, which dip seawards much as rocks of the same age dip into Lake Superior.

North-western part of the Shield.

North-west of Lake Superior, while retaining the same general character, the Archaean surface slowly sinks, till at the outlet of Lake Winnipeg it is only 710 feet above the sea. It forms the whole north-east shore of Lake Winnipeg and is faced by low cliffs of Ordovician limestone on the opposite side.

The widening area of ancient rocks to the north has been described by Mr. J. B. Tyrrell, who has explored much of it, as having a low and unpronounced relief, nowhere reaching a height of more than 1,700 feet, and usually under 1,000. He divides it into an interior upland and a coastal plain, the former having a mean elevation of from 900 to 1,000 feet with a surface of sandy till and rounded boulders or broken fragments of rock with sandy ridges or eskers stretching across country. The coastal plain includes the part below the highest marine beach, 500 or 600 feet above sea-level. Much of it is covered with till like that of the upland, but other parts are sandy plains or terraces left by the sea. The coastal plain is about 50 miles across near Fort Churchill, but widens towards the north to about 300 miles, and probably joins the coastal plain along the Arctic Ocean. Most of the rock exposed is granitoid gneiss, but there are some areas of Huronian quartzite and large tracts of late pre-Cambrian conglomerates and sandstones like the Keweenawan of Lake Superior, associated with the usual eruptive dykes and sheets. In many places the gentle seaward slope of the coastal plain continues below water, so that the space between the high and low tide may be miles in width, and even canoes with but a few inches of draught must keep miles from shore when following the coast to find depth enough of muddy water for navigation. There are parts of the coast, however, as near Fort Churchill, where the rocks rise from deep water and vessels can come close to the shore. This prevalent shallowness of the south-western side of Hudson Bay is of practical consequence in choosing a terminus for the Hudson Bay railroad, since Fort Nelson, the natural port for the prairies, would require a large amount of dredging to be of service.

Chesterfield Inlet, towards the north-east corner of Hudson Bay, is a fiord-like arm of the sea somewhat suggesting Hamilton Inlet on the Atlantic coast. It extends a hundred miles westward, where a chain of lakes and rivers joins it from the interior.

The Archaean area west of Hudson Bay has been shown by Tyrrell to have been the centre from which the Keewatin ice-sheet spread in all directions, transporting boulders and leaving striae on the rounded rock-surfaces, thus recording the direction of its motion.

On the other side of the Keewatin area pre-Cambrian rocks extend north-west from Lake Winnipeg, completely enclosing Lake Athabasca, striking the middle of Great Slave Lake, and touching the shore of Great Bear Lake, a series of basins falling a little short of the Great Lakes in magnitude. All along this boundary the Archaean surface sinks gently towards the plains beneath the usual fringe of older Palaeozoic rocks, which nearly always intervenes between the ancient Shield and the Cretaceous beds of the prairies. Still further towards the north-west, Dr. J. M. Bell has shown that the Archaean includes Laurentian gneisses and also rocks like the Keweenawan, known to the natives for generations as a source of copper along the Coppermine River. The metal occurs native in amygdaloids, as in the copper mines of Michigan. The country near Great Bear Lake is described as generally flat, but with some hills reaching 1,000 feet.

The Archaean of the Arctic Islands.

The part of the Shield stretching eastwards along the Arctic shore and extending into several of the great Arctic islands has been little studied; but in Baffin Land and to the north of Hudson Strait Dr. Robert Bell has found wide bands of crystalline limestone associated with gneiss, suggesting the Grenville series of the Thousand Islands. The surface has the usual hummocky character, with many lakes, including Netteling and Amajuak, bodies of water 120 or 140 miles in length. It is interesting to note that glaciation has left its marks on these treeless wastes, as on the more temperate parts of the Shield further south, but that scarcely any land ice remains on the Archaean surface.

The Palaeozoic Lowlands of Hudson Bay.

As described above, the east and also the north-west shores of Hudson Bay are of early or late pre-Cambrian rocks, but to the south and west of James Bay and Hudson Bay they are hidden by 100,000 square miles of flat shales and limestones of Palaeozoic age, giving a surface of very different character from the 'rocky lake' country. Most of this area is within the province of Ontario, but these deposits occupy also about 40,000 square miles on the north of Hudson Bay, including most of Mansfield, Coats, and Southampton islands. As these beds usually dip gently beneath the sea it is probable that a large part of the floor of Hudson Bay consists of them. The Ordovician, Silurian, and Devonian shales and limestones nowhere rise as much as 500 feet above sea-level, and are very largely buried under the Pleistocene marine clay and sand, or else are covered by widespread muskegs, making a flat and dreary surface very imperfectly drained except immediately along the rivers. Almost the only outcrops of rock are along the watercourses, especially where the rapids are cutting downwards; and upstream from the main area there are many remnants of the same rocks left in hollows of the Archaean, showing that these soft sediments are being rapidly stripped from the harder surface beneath. It is not unlikely that the Ordovician of Churchill River once joined that of Lake Winnipeg less than 170 miles to the west, and that the Silurian of James Bay reached that of Lake Temiskaming and of southern Ontario. Their partial destruction by glacial action provided lime for the fertile soils of the clay belt to the south. When the region stood 500 feet lower at the close of the Ice Age, probably the whole of this Palaeozoic area was under water, and it may be that the Hudson Bay region is still slowly rising, so that a wider stretch may be exposed in the future.

It is interesting to note that Hudson Bay is so shallow that an elevation of 500 feet more would turn it all into boggy land like its present southern shores. There is a gradual deepening of the water towards Hudson Strait, however, where depths of 200 and occasionally more than 300 fathoms are found, suggesting an ancient system of rivers with well-graded channels emptying into the Atlantic when the north-eastern side of the continent stood higher. The basin is very ancient, however, and must have existed before the Ordovician and probably before the late Pre-Cambrian (Animikie), since iron-bearing rocks of that age dip seaward around many parts of its shores.

The Northern Archipelago

Baffin Land mainly consists of Archaean granite and gneiss, and the eastern parts of Devon Island and of Ellesmere Land are formed largely of bare, rolling surfaces of Archaean rocks; but most of the islands to the west of this line are covered with later formations, including in some places a very complete series from the Cambrian to the Carboniferous, while Triassic areas occur, as well as scattered patches of unconsolidated Tertiary deposits. The most widely spread sedimentary rocks are hard Silurian limestones, which are often slightly inclined and may rise as great escarpments 1,000 or even 3,000 feet in height. They resemble the Niagara escarpment of Ontario on a gigantic scale; and mariners report far-stretching cliffs with the level stratification standing out very distinctly. The overlying Devonian and Carboniferous rocks are generally crumbling sandstones easily weathered to form soils covered with rich pasture for the musk oxen. An east-and-west belt of islands, including Grinnel, Bathurst, Melville, and Prince Patrick islands, consists mainly of Carboniferous rocks known to contain coal seams of excellent quality at several points, but too inaccessible to be of value under present climatic conditions. The Mesozoic rocks, mostly soft sandstones and shales, form a group of islands more to the north and east. The scattered Tertiary areas of sand and clay contain many plant remains suggesting a warm temperate climate in geologically recent times. They enclose outcrops of fair lignite which are accessible from a relatively ice-free sea, unlike the Carboniferous coal further west, and may in the future have a commercial value. The whole association of Kainozoic plants and coal recalls Spitsbergen, where coal deposits of this age are mined.

Ice-conditions and elevation of northern islands.

These far northern islands might be expected to be largely ice-capped, and perhaps even completely buried under great sheets like those of southern Canada a few thousand years ago; but this is far from being the case. The known areas of inland ice are comparatively small, and are confined to plateaux or mountains not far from the seashore, while the lower inland parts seem to be well covered with vegetation during the short summer. There is little evidence of a wider glaciation during the Ice Age except near Hudson Bay and Strait.

The Arctic Islands do not often rise to actual mountains, though tablelands seem frequent. Ellesmere Land in the far north is said to have Archaean ranges 4,000 or 5,000 feet in height, and Dr. Boas reports mountains 8,000 feet high in the central parts of Baffin Land. If this is correct, the far northern mountains may surpass the Torngats of Labrador in altitude. The coasts of the great northern islands are usually rugged, with fiords and promontories and smaller islands, as in most Arctic regions.

The Interior Continental Plain

The prairies: Manitoba, Saskatchewan, Alberta.

In a former section the Archaean Shield was described as dipping gently towards the south-west beneath Palaeozoic sedimentary rocks as the plains are approached, while a succession of great lakes follows the margin. Going west from Lake Superior by the Canadian Pacific Railway, one traverses for 360 miles typical rocky lake country reaching its climax at Lake-of-the-Woods. At length the more rugged hills of gneiss grow less frequent, and only softly rounded surfaces of the ancient rocks rise above the soil, which spreads flatly westwards with a small covering of trees. The trees cease and the bare prairie begins some time before Winnipeg is reached.

The horizontal sedimentary rocks overlapping upon the Archaean mark the beginning of the prairie from the geological side. The fringe of Lower Palaeozoic rocks is not wide, and the Carboniferous is wanting or completely hidden by later rocks. The gap in time is so great that soft shales and sandstones of the Cretaceous rest upon hard Silurian or Devonian limestones. The flat and undisturbed Cretaceous beds contain no chalk nor flints, and crumble so easily in the weather that unchanged rock is seldom seen on the plains except where rivers are cutting their channels downward. The contrast between the endless rocky hills of granite or greenstone to the east, and the soft loam or clay of the prairie with its thick black soil, is most striking. There are reminders, however, of the rocks of the east, since the Keewatin ice-sheet expanding towards the south and west spread its boulder-clay far and wide, and the pink granites and gneisses of its gathering-ground are here and there scattered over the black prairie soil. The richest and most level of these soils dates from a somewhat later time, however, when the Keewatin glacier still joined hands with the Labrador sheet, but was on the wane. The surface freed from ice sloped gently northwards and formed a basin for the waters, which escaped southwards through the valley of the present Red River into a tributary of the Mississippi,

The glacial Lake Agassiz.

and thus the great glacial lake named after Agassiz arose. Most of Manitoba and Saskatchewan was flooded, and an arm reached eastward to Rainy Lake in Ontario. Beyond the international boundary it invaded Minnesota and North Dakota, and its total area, probably never all occupied at one time, was about 100,000 square miles.

The flatness of Winnipeg prairie is largely due to the even coat of mud and silt which settled to the floor of this shallow lake. When the two ice-sheets parted company an outlet was opened towards Hudson Bay, Nelson River found its devious way to the sea, and Lake Agassiz was drained, leaving as remnants Lake Winnipeg and the other Manitoban lakes. There were similar ice-dammed lakes further west and north, hitherto unnamed, providing level prairie near Calgary and Edmonton ; but much of the surface elsewhere is rolling rather than flat.

Extent of the plains.

In latitude 49° at the United States boundary the plains extend for 800 miles westward to the foothills of the Rocky Mountains, but as the Rockies trend north-westward and the Archaean boundary somewhat more to the west, the plains narrow gradually up to latitude 62°, after which they expand again to a width of nearly 300 miles at the Arctic Ocean.

Cretaceous rocks underlie only part of the plains as thus defined, since later rocks, such as the Laramie, a transition from the Cretaceous to the Eocene, cover much space to the west, and Palaeozoic beds extend widely in the northern part. Everywhere, however, the underlying rocks are nearly horizontal. The plains are far from level, nevertheless. At Winnipeg the prairie is only 760 feet above the sea, forming almost the lowest part, while Calgary in the vicinity of the foothills is 3,400 feet above the sea, so that in latitude 57° there is an average ascent westwards of three and a third feet per mile. The rise is not uniform, since two parallel lines of escarpment or of more abrupt slope are found in the southern parts of the plains. Further north these can no longer be distinguished with certainty.

Divisions of the plains.

On this basis Dr. Dawson divided the southern plains of Canada into three parts: (1) the Red River valley, at about 800 feet above the sea, with an area of 55,000 square miles, including many lakes; (2) the Missouri Côteau, with an elevation of about 1,600 feet and an area of 105,000 square miles; (3) 134,000 square miles of less regular plain having an average elevation of 3,000 feet. Towards the north there is in general a slow descent, so that, for example, Edmonton, 175 miles north of Calgary and 2,190 feet above sea-level, lies 1,200 feet lower, showing an average gradient of nearly 7 feet per mile.

Elevations.

This great triangular area, while on the whole a plain, has numerous elevations and even some 'mountains', in the local phraseology, rising with easy slopes hundreds of feet above the general level. As they are more or less cut by ravines along the rivers and are commonly wooded, they make striking features in contrast with the monotony of the prairie. In northern Manitoba, the Duck, Riding, and Porcupine mountains reach from 2,000 to 2,600 feet above sea-level; and on the southern boundary Turtle Mountain is reputed to be 2,300 feet high. Further west, morainic hills are seen near Brandon and at the rise of Missouri Côteau, and broader elevations occur in the Cypress and Sweet Grass hills which reach 4,500 feet. Often these tablelands are capped with resistant conglomerates later in age than the Cretaceous, e.g. of the Upper Laramie (Eocene), or in southern Saskatchewan the Oligocene. In most parts of the prairie country, however, the deep valleys cut by the rivers and their larger tributaries provide the most notable physiographic features. Rows of trees on the moist slopes of the valley may mark the watercourse from afar in a treeless country, but often one comes without any warning upon one of these wide chasms in the vast plain and looks with astonishment on the muddy river meandering at a low level.

Dry valleys and saline lakes.

In the south-western part of the plain there are dry valleys, locally termed 'coulees', typical results of the work of flowing water, but now showing moisture only by a more luxuriant growth of plants as compared with the sallow stretches of yellowish grass, sage-bush, wormwood, and cactus around them. The 'coulees' are evidences of the moister climate which ruled towards the close of the Ice Age. The change of climate has advanced so far in some parts of southern Saskatchewan and Alberta that many ponds and small lakes completely dry up towards the end of summer, leaving a shallow basin frost-white in the middle and bordered with red samphire [p. 86]. Larger lakes without outlets are permanent bodies of saline water, generally spoken of as alkaline, containing sodium sulphate and other salts as well as sodium chloride. The contrast between the rank, luxuriant growth of plants round many Manitoban lakes of fresh water and the arid shores of these western basins is strongly marked. The largest examples of the kind are the Quill Lakes near the centre of Saskatchewan, and the Old Wives Lakes (Chaplin and Johnston), west of Medicine Hat in the same province.

Minerals

Since the prairie region is formed of horizontal beds, outcrops of economic minerals are only to be expected along river cuttings or on the flanks of the so-called mountains. In the two eastern provinces the Laramie formation is of some importance for its lignite beds, which occur at Turtle Mountain, the Souris region near Estevan, and elsewhere in southern Saskatchewan. This lignite is black and coal-like in appearance, but contains 15 or more per cent. of moisture, which dries out on exposure to the air, when the coal falls to small pieces. It cannot be stored for any length of time, and is useful mainly for local purposes. In Alberta, rocks of nearly the same age contain beds of better lignite, making a *serviceable* fuel. The city of Edmonton is on such a coal-field, and the black seams are easily seen in the deep valleys of the Saskatchewan and Pembina rivers. Near Lethbridge in south-western Alberta there is coal of much better quality, mined in large quantities and widely used as fuel on the prairies. It occurs in flat seams like the other deposits mentioned, but is of greater age, belonging to an older group of Cretaceous rocks, the Belly River series.

Vegetation. The prairie or treeless part of the plains does not end at a definite point, but north of latitude 54° becomes mixed with 'bluffs' or groves of poplars or evergreens, and so blends into the northern forest region. Beyond this along the river valleys there may be open spaces, but woods predominate though the soil remains much the same. As suggested in an earlier paragraph, the western plains sink gently from their highest level in south-west Alberta to sea-level in the delta of Mackenzie and Peel rivers at the Arctic Ocean. They become treeless again in the far north because of the cold climate and assume the character of tundra.

Erratics. One very curious problem of ice action is worthy of attention here. It has been mentioned that boulders of Archaean rocks are scattered over the prairies, evidently derived from the Keewatin region, a starting-point averaging about 1,000 feet above the sea. These erratics may be seen from the railway as far west as Calgary or Edmonton, and have been found at elevations of 4,500 feet or more in the southern foothills. It appears that the Keewatin ice-sheet had climbed 3,000 feet in its advance across the 800 miles of prairie. It is possible, however, that the western part of the plains stood lower at that time. Dr. Dawson believed that they were then below sea-level, so that the blocks were transported by icebergs. There is no direct proof, however, that the sea covered the prairies at so late a period as the Pleistocene, and it is probable that the plains were more nearly level then than now, and that ice-floes on the great glacial lakes, whose old beaches are in evidence at the foot of the mountains, may have helped to transport the boulders.

The foot hills. The plains do not cease abruptly at the foot of the first range of the Cordillera, but pass more or less gradually into the foothills, a belt of disturbed country sometimes 20 or 30 miles wide, formed of the same Cretaceous or Laramie shales and sandstones, but no longer horizontal. The thrust which pushed the mountains into place crumpled the soft beds beyond, tilting and folding them in similar ways, but on a smaller scale. Rock is seldom

PLATE VII. BOW RIVER BELOW BANFF, ALBERTA

PLATE VIII. BOW RIVER FALLS, NEAR BANFF, ALBERTA

(Office of the High Commissioner for Canada)

seen on the prairie except along watercourses, but it is strongly in evidence in the foothills, which are often topped with some harder ridge of sandstone or conglomerate. Some of the foothills rise 1,000 or 2,000 feet above the plains and reach elevations of more than 5,000 feet above the sea, so that they are hills only by contrast with the mountains beside them. Usually they are crested with spruce or pine forest, and seen from a neighbouring peak of the Rockies the effect is of a sea of pale green prairie dashing in waves with dark green crests against the shore of mountains. On the prairies the rivers usually have a uniform flow seldom quickening to a rapid, but among the foothills they often plunge as beautiful falls over some harder ledge of the upturned strata. An example may be seen in the Kananaskis Falls, near the Canadian Pacific Railway between Morley and the Rockies.

The Cordillera

British Columbia: general description.

As the Rockies are approached from the plains, they are seen first from more than a hundred miles away as a delicately blue serrated rim on the south-western horizon. Advancing, they rise and become more solid, till beyond the foothills the frontal range stands out as bare cliffs, reaching 3,000 or 4,000 feet above the plains and stretching with varied sky-line as far as the eye can reach in each direction. This wall of rock justifies the popular name, and is broken only by a few gaps, like Bow Valley, where a river escapes from the mountain world beyond. The term Rocky Mountains is often applied in a general way to the whole sea of mountains between the plains and the Pacific coast, covering a width of 400 miles, and extending, so far as Canada is concerned, from the International Boundary for 1,100 miles to the north-west. If the Mackenzie Mountains between the Mackenzie and the Yukon rivers are considered as continuing the Rockies to the Arctic Ocean, the whole length is 1,600 miles. It is better, however, to limit the name of Rocky Mountains to the eastern chain, and call the broad belt of mountainous country along the Pacific coast the Cordillera. As usually defined, the Cordillera extends south through the western United States and includes also the Andes of South America. There is, however, little unity of age or structure among the ranges covered by this term, the only common bond being their relation to the settling sea-bottom of the Pacific.

The four mountain chains.

There are really four chains of mountains in the Canadian Cordillera, the Rocky Mountains proper bordering the great plains, the Selkirks and the Gold Ranges coming next, then the Coast Ranges, and finally an outer fringe of mountainous islands, belonging to a chain partly submerged in British Columbia, but more continuous in the 'pan handle' of Alaska towards the north-west. These four chains were elevated at very different times and present very different features as to rocky structure, but all of them have peaks of Alpine character rising well above snow-line and serving as the gathering-ground for glaciers.

Following the Canadian Pacific Railway westward from the prairies, one enters the Rockies by the 'Gap' of Bow Valley, travelling sixty miles through the highest set of ranges, ending with a rapid descent to the deep Columbia valley. Then come the Selkirk and the Gold Ranges with a breadth of about 100 miles, ending in a somewhat ill-defined interior plateau. The Coast Ranges are scarcely touched by the railway, since they end towards the south at Burrard Inlet; but the southern summits, a mass of mountains belonging to the outer chain, make a striking part of the scenery at the city of Vancouver. Authorities vary as to the names of these chains, but the customary ones are those used above. The sharply defined eastern chain is almost always called the Rockies or Rocky Mountains, though Dr. Dawson suggested the name Laramides, because they were raised in Laramie times. The second belt of mountains is not so definitely bounded, and parts of it have received separate names, such as the Purcell Range to the south-east, the Selkirks to the north and west, the Columbia Mountains still further west and north, and the Cariboo Mountains in northern British Columbia. For these ranges, as a whole, the name Selkirks is often used, but sometimes the general term Gold Ranges is applied to them. This is a suitable name, since all of them are gold-bearing, but has not come into wide use. The Gold Ranges are separated by a vaguely bounded interior plateau from the Coast Ranges, which are separated from the outer ranges of the islands, by the narrow channels of the sea followed by coastwise steamers from Vancouver to Alaska.

The distinctions made in previous paragraphs apply with certainty only to the southern part of the Cordillera, but the Mackenzie Mountains probably represent the northward extensions of the Rockies and Gold Ranges.

The Rocky Mountains.

The Rockies rise abruptly from the plains towards the north-east and are almost as abruptly cut off from the Gold Ranges towards the south-west by a remarkable valley, thousands of feet deep and very straight and continuous for 450 miles, with a probable extension for 400 miles further towards the north-west. Almost all the great rivers of British Columbia have their beginning in this valley. North of the 850 miles thus defined, mountains of a similar age and character extend to the Arctic Ocean.

The bold cliffs of the frontal range of the Rockies near Bow River represent the upturned ends of great tilted blocks of Palaeozoic limestone, quartzite, and slate, their south-westward slope corresponding to the amount of tilt; and there may be several of these tilted blocks in succession. As shown by Mr. McConnell, of the Canadian Geological Survey, the outer block was pushed miles out over the plains, and the others ride upon one another, so that if all were slipped back into their places the width would be increased by twenty-five miles. This 'writing-desk' type of mountain, so characteristic near Bow Pass, is replaced along Athabasca Valley west of Edmonton by mountains formed by folding, and this is generally true of the central parts of the range, where broad anticlines and synclines have been carved by rivers and glaciers into castles and cathedrals. Often the top of such mountains is formed of the bottom of a synclinal fold, while the neighbouring valleys have been cut deeply into the shattered anticlines.

It is likely that in the beginning the soft shales and sandstones of the Cretaceous formed the upper layers of the mountains, but they were long ago removed from the exposed parts and are now found only where protected at the bottoms of the longitudinal valleys. These narrow basins are of great practical importance on account of the coal they contain. The strains and pressure of mountain building have greatly improved its quality as compared with the coal of the prairies, so that the lignite has been turned to excellent bituminous coal, or in some cases into anthracite. The largest and best supplies of coal in western America are contained by these coal-fields enclosed in the Rockies.

Elevation of the Rockies.

The Rockies are the highest of the four chains of the Cordillera in the southern part of Canada, but are greatly surpassed by a few peaks near the Arctic Circle. The north-eastern range is generally from 7,000 to 9,000 feet in height, and each successive range grows a little higher until the central parts rise from 10,000 to 12,500 feet above the sea. There are probably hundreds of peaks above 10,000 feet, but perhaps not more than half a dozen reach 12,000 feet, and only one attains 13,000. What there may be in the little explored northern part of the Rockies must be left to the future to determine. Though none of the Rockies can be compared in height with the Himalayas or Andes, the depth of the valleys and low snow-line due to their northern latitude give them distinctly the high Alpine character, and they far surpass in this respect the higher mountains of the United States and Mexico.

Glaciers.

In the central and western parts glaciers are very numerous, though not usually large, and sometimes fifty may be counted from a single summit. Naturally they are more numerous on the side towards the Pacific where the snowfall is greatest. The largest known *nevé* in the Canadian Rockies is the Columbia snow-field, estimated

PLATE IX. LAKE MINNEWANKA, ROCKY MOUNTAINS (ALBERTA)
(Office of the High Commissioner for Canada)

PLATE X. MOUNT ASSINIBOINE, ROCKY MOUNTAINS

to cover nearly 200 square miles. This is about 60 miles north-west of Laggan on the Canadian Pacific Railway, and lies to the east of Mount Columbia (12,500 feet), one of the highest peaks. Nearly a dozen glaciers radiate from it into different valleys, and its drainage goes to three oceans, the Pacific, the Atlantic (Hudson Bay), and the Arctic.

Mountaineering.

Mount Columbia and several of the surrounding peaks have been explored and climbed by British mountaineers, and a delightful book by Stuttfield and Collie gives an account of the work and provides the best map of the region. The most striking peak south of the Canadian Pacific Railway is Mount Assiniboine, 11,860 feet high, a fine pyramid often compared to the Matterhorn. Though not of as difficult ascent as the Swiss mountain it is by no means an easy climb. It was first ascended by the Rev. James Outram in 1900. Many years ago heights of 16,000 or 17,000 feet were assigned to Mounts Brown and Hooker, one on each side of Athabasca Pass to the north of the Columbia group of mountains; and they were long supposed to be the highest mountains in Canada. When climbed by Stewart and Coleman, Mount Brown proved to be only 9,050 feet high and Mount Hooker was still lower, so that they are surpassed by hundreds of other peaks. Less than fifty miles north-west of Athabasca Pass stands Mount Robson (13,000 feet), the highest known point in the Canadian Rockies. It is on the western side of the range, and only six miles from the low valley between the Rockies and Gold Ranges. It towers 10,000 feet above Fraser River as a magnificent pyramid with walls of precipices too steep for snow to lie; while its opposite side with gentler slopes is covered with snow-fields and hanging glaciers. Several attempts have been made to climb Mount Robson, but only one party has succeeded, that of Messrs. Kinney and Phillips, who took very serious risks in both the ascent and the descent.

Though the Canadian Rockies present no very high peaks, they include a variety of mountain types providing both easy and difficult climbs amid fresh and beautiful surroundings. The valleys are often park-like and charming, with waterfalls and lakes of gem-like colour, in the latter respect surpassing the Alps; and there are still numberless valleys and mountains unvisited and unnamed.

Railway passes. The Canadian Rockies are crossed at three points by railways with comparatively low passes, the most southern, close to the International Boundary, being the Crow's Nest Pass at 4,449 feet; the second, the Kicking Horse Pass (5,329 feet) used by the main line of the Canadian Pacific; and the third, the Yellow Head Pass (3,738 feet) followed by the Grand Trunk and Canadian Northern Railways. There are two or three other possible routes, but they are usually not met by a suitable pass through the Gold Ranges. The easier of the two southern passes through the Rockies, the Crow's Nest, loses much of its value because no outlet has been found to the Pacific.

Mackenzie Mountains. The eastern part of the Mackenzie Mountains is related in structure and geology to the Rockies, and may be looked on as their northward continuation. They have been crossed at only three points and are comparatively little known. Their summits are reported to reach 7,000 or 8,000 feet, and to be rugged and Alpine in character, with snow-fields, but no actual glaciers, owing to the small snowfall in that interior region, barred from the moisture of the Pacific by the much loftier Coast Ranges.

The Selkirks and the Gold Ranges. The Selkirks are cut off from the Rockies by the strange valley mentioned before as being occupied by the headwaters or tributaries of the largest British Columbian rivers. The cause of this long, straight valley, longer, wider, and more profound than the Grand Canyon of the Colorado, is not certainly known, but its position between the youngest and the oldest of the Cordilleran chains implies some significant tectonic origin. The Kootenay River flows south-eastward through it, and the Columbia north-westwards almost from the same point and at the same level. Years ago Mr. Baillie Grohman cut a channel between them and so turned the Selkirk Range into an island. It is a curious example of the vagaries of western watercourses to find these two rivers setting out 2,600 feet above the sea, in opposite directions, and meeting again at a point 1,200 feet lower, after completely surrounding a range of mountains 200 miles long and 80 miles wide, with summits above 11,000 feet in height. The Selkirks, as thus defined, make a fairly compact and uniform group of mountain ranges, but the term is often widened to include part or all of the other Gold Ranges, in which case the unity is lost.

The south-western part of the Selkirks and the Gold Ranges consists largely of ancient granite and gneiss, the protaxis of the Cordillera, probably equivalent in age to the Laurentian of eastern Canada, but on the side towards the Rockies there are steeply tilted and folded sedimentary rocks, thought by Dawson to be Cambrian, but considered by Walcott and Daly to be late pre-Cambrian or 'Beltian'. These sediments have been metamorphosed into slates, schists, and quartzites, resistant rocks that give bold mountain forms quite as imposing as those of the Rockies, and withal sounder rocks, a matter of some interest to the climber. Though somewhat lower than the Rockies, there are many points above 10,000 feet, and Mount Sir Sandford, twenty-seven miles north of the railway, attains 11,634 feet as determined by triangulation. It was climbed in 1912 after one or two unsuccessful attempts.

Snow-fields, glaciers, and forests.

The Selkirks, especially on the west side, have an enormous snowfall, more than forty feet per annum, and as a result have large snow-fields and many glaciers at the higher levels. The Asulkan glacier and the surrounding mountains have been well described by the Rev. Spotswood Green, the first to do much climbing and exploration in that part of the range. The timber line, at 7,500 feet, is not far below snow-line, and the rainy slopes of the valleys have a growth of trees and shrubs as luxuriant as in a tropical forest. Cedars reach a diameter of fifteen or twenty feet, with a corresponding height, and the lower thickets of devil's clubs and ferns of man's height are almost impenetrable without an axe. With rugged peaks and pinnacles rising through deep snows above valleys covered with rank forest, the Selkirks present more vivid contrasts, as well as more difficulties, than the Rockies, and their grandeur is enhanced by the fact that the Columbia valley on their western side is only 1,430 feet above the sea, while mountains a few miles to the east are 9,000 feet higher.

Towards the United States boundary the mountains are lower, and in the Kootenay region, where the climate is drier than along the main line of the Canadian Pacific Railway, there is far less snow, and the range grows more commonplace. Even here, however, the long narrow lakes between the mountains are notable. The Arrow lakes on Columbia River and the Kootenay and Slocan lakes may fairly be described as inland fiords.

The Gold Ranges, so far as known, are lower than the Selkirks, but of the same snowy and alpine character. They pass towards the west without any well-marked boundary into the Interior Plateau.

Relief. As the Selkirks and Gold Ranges were the earliest formed of the Cordillera mountains, in a climate implying enormous erosion, it is evident that their present elevation and bold relief must be due to an important recent uplift, setting the rivers at work carving the present canyons. Though their rocks are so aged the mountains themselves present many features of youth.

Minerals. Except coal in some of their valleys, the more modern Rockies contain scarcely anything of economic value, while the ancient Selkirks and Gold Ranges (though devoid of coal) are widely charged with metals. The silver-lead mines of the Kootenay region and the gold-copper deposits of Rossland and the Boundary are examples of this, the coal and coke of the Crow's Nest moving westward to smelt the ores of the Selkirks. As the name of Gold Ranges suggests, these mountains were famous for their placer gold in early days, when miners worked in almost every river and creek. The placers are worked out in the southern parts, but the Cariboo Mountains and Cassiar, in northern British

Columbia, still furnish ‘ dust ’ and nuggets to the placer miner.

Whether the Gold Ranges should be considered to extend north to Yukon Territory is uncertain, but the granites found in the western part of the Mackenzie Mountains suggest that after a gap the old protaxis continued towards the Arctic Ocean.

The Interior Plateau.

As defined by Dawson the Interior Plateau is a belt of comparatively level country 100 miles wide and 500 miles long between the Gold and the Coast Ranges. Near the parallel of 49° it is over 4,000 feet above the sea, but it gradually sinks to less than 3,000 feet towards the north, where it ends in scattered mountains. Four degrees of latitude beyond this, the upper Yukon basin presents similar features and may be considered an extension of the plateau.

Geologically the Interior Plateau is very complex, including large amounts of volcanic rocks, ash, and lava flows, as well as Palaeozoic and Mesozoic sediments. In the Nicola district a Tertiary basin with good seams of coal rests flatly on the upturned edges of the older formations. The region is an old peneplain recently unequally elevated. Since the elevation, which affected the adjoining mountains also, there has been time for powerful creeks and rivers, fed from the heavy precipitation of the Gold Ranges, to cut deep canyons. The wild valley of Thompson River near Kamloops, with the raging muddy torrent at its bottom, is a characteristic example, and it is evident the plateau is in process of destruction, and in time will become a region of low rounded mountains separated by deep valleys.

The Coast Ranges.

The Coast Ranges form a very definite geological unit, since they consist mainly of a long stretch of batholithic eruptives varying from granite to diorite, with some metamorphosed Palaeozoic sediments along their flanks or included in the complex. With a breadth of about 100 miles they extend along almost the whole coast of British Columbia, and then continue towards the north-west, reaching a total length of 900 miles, the latter part, however, being separated from the Pacific by a band of sedimentary rocks in Alaska.

The Coast Ranges appear to have been elevated not long after the Triassic, but they have undergone various changes of level since that time. The fiords of the coast were once, no doubt, land valleys, implying a greater elevation than at present. The later depression may have been connected with the accumulation of the great Cordilleran glaciers with which the Ice Age began.

Fiords of the Pacific coast.

This chain shows no parallel ranges of mountains like those of the Rockies, but consists of irregular blocks separated by deep valleys, cut by rivers during the earlier more elevated stage, and widened and scoured into the typical U shape by the Pleistocene glaciers. When the ice departed the valleys were left floored by the sea in many cases, giving the network of fiords and channels which form the present tattered fringe of the continent. Several of these fiords cut half-way or more across the mountain chain and end towards the interior as river valleys, giving access to the interior of British Columbia, thus slicing the range into nearly separate blocks. The valley of Skeena River is of this sort, providing an easy grade for the Grand Trunk Pacific Railway to reach the coast.

Though the Coast Ranges are not lofty, seldom rising above 9,000 feet, the heavy precipitation along the Pacific provides many snow-fields and glaciers, in some cases almost reaching sea-level.

Crossing the Coast Ranges by the Skeena valley one finds no sharp boundary inland, the more closely grouped mountains ending in scattered masses rising as isolated peaks from wide valleys. These low valleys consist in part of coal-bearing Cretaceous rocks whose supplies of fuel will be of great consequence in the future. The flat intermontane valleys of the interior are fertile and sometimes prairie-like, and are being taken up as farm lands, where fields of grain may be seen enclosing mountain groups 8,000 or 9,000 feet high, with small glaciers about their summits.

As one follows the Coast Ranges north-west the snow-line sinks and glaciers increase in size, and the boundary between British Columbia and the 'pan handle' of Alaska runs from peak to peak through a wild and snowy mountain territory. The fiord scenery of the Coast Ranges may fairly be compared for beauty and interest with that of the Norwegian coast; but the lower slopes of the mountains are hidden by a tremendous growth of cedars, spruces, and other evergreen forest trees, unlike the often bare mountain flanks of Norway.

Minerals of the Coast Ranges.

Ores of copper, silver, and gold have been found at many places in the Coast Ranges, but the side towards the Pacific is so moist and so densely carpeted with moss and bushes beneath the forest that prospecting is difficult in spite of easy access from the sea. The drier interior flank is being opened up for exploration by the construction of railways. Thus far no mines of great importance have been developed. The Atlin placer gold region just south of White Pass in northern British Columbia lies to the east of the Coast Ranges in a region of isolated mountains surrounded by wide valleys. It may, however, be considered to belong rather to the Gold than the Coast Ranges.

Yukon Territory and the Klondike.

One of the most northerly fiords penetrating the coast fringe of Alaska is Lynn Canal, which reaches the Alaskan port of Skagway, the point of entry to the Atlin and Klondike gold region. From Skagway the White Pass railway climbs 2,897 feet from tide-water to the head of navigation on Lewis River, one of the chief sources of the Yukon. The head-waters of this great river of the north rise only eighteen miles from the sea at Skagway, after which they flow 2,000 miles before reaching Bering Sea, with so well graded a valley that stern-wheel steamers navigate the Yukon and the Lewis rivers for 1,800 miles out of the 2,000.

The broad Yukon valley, to the north of the somewhat mountainous district of Atlin, may be considered an extension of the Interior Plateau of southern British Columbia. The Klondike region and much of the less carefully explored territory around may be described as a tableland, once a plain nearly at sea-level, but later elevated and greatly carved by rivers, leaving gently rounded ridges and domes at the watersheds. The valleys between have been cut down with rather steep slopes to depths from a few hundred to 2,000 feet below the general level. Afterwards the region sank somewhat, so that the creeks and rivers have aggraded their valleys, filling up the old bed-rock channels with gravel for a considerable thickness, followed by a bed of peat in most places.

In the Klondike itself the highest elevation is the 'Dome', 3,500 feet above the sea, while Dawson City on the Yukon stands at 1,200 feet and represents the lowest point. The bed-rocks are mostly Palaeozoic slates and schists penetrated by dikes and bosses of eruptives and greatly tilted and folded. In parts of the region, however, there are Tertiary beds of sandstone and shale containing coal, which has been mined at Tantalus and Five Fingers.

The Klondike region was the only extensive area in Canada to escape the glaciers of the Ice Age. As it is only a degree or two south of the Arctic Circle, this seems surprising, but is readily accounted for by the range of great mountains separating the comparatively low tableland from the Pacific. The St. Elias Range, with peaks above 18,000 feet, robbed the air currents of their moisture, leaving only a very moderate snowfall for the interior, which easily melted away during the short summer. That the climate was cold is shown by the hundred or more feet of frozen peat and gravel in the placers, and also by the sheets of blue ice buried under later silts and gravels, and now forming part of the banks of Klondike River. Cold alone is not sufficient to make an ice-sheet.

At their best (in 1900), the Klondike placers produced $22,000,000 worth of gold in one year, but the output has greatly fallen as the richer ground became exhausted ($4,580,000 in 1911). The source of the gold is not to be found in large quartz veins but in small stringers of quartz in the schist; and it is believed that thousands of feet of these rocks were weathered and destroyed to supply the extremely rich Klondike placers, which have scarcely been equalled in the world.

The outermost range of mountains towards the west is largely submerged along the British Columbian coast, consisting of the great island of Vancouver, 270 miles long, and the group of Queen Charlotte Islands, 170 miles to the north-west, having a length of about 150 miles. Vancouver Island resembles in some ways the Coast Ranges, being formed mainly of Palaeozoic rocks penetrated by deep-seated eruptives and greatly metamorphosed, but it has also a fringe of gently inclined Cretaceous beds along its north-east side. The coal belonging to these beds is the best on the Pacific coast of America south of Alaska, and is mined on a large scale near Nanaimo and Comox. It is interesting to find coal-mines worked beneath the sea on Vancouver Island at the extreme west of Canada, just as coal-mines are working beneath the Atlantic on Cape Breton Island at the extreme east. The coal of the two islands is of about the same quality in spite of their ages being very different. Vancouver and Queen Charlotte Islands.

Vancouver Island is almost an unbroken mass of mountains covered with great forests of evergreen trees below timber-line, but rising to summits 8,000 or 9,000 feet above the sea with considerable snow-fields and glaciers. This wild interior, with its moist climate and dense growth of underbush and timber, especially on the western side, is very difficult to explore, and parts of it are still scarcely known. The island is separated from the mainland at the Seymour Narrows only by half a mile of sea, which it is proposed some day to bridge; and there is reason to believe that during the Ice Age the Cordilleran glacier crossed the channel and carried erratic blocks and boulder clay across from the Coast Ranges. Vancouver Island has similar inlets, fiords, and islands to those of the mainland, with magnificent scenery, especially on its rainy and little-visited south-western coast, but the areas of available farmland are not great and the heavy timber makes the land difficult and expensive to clear. Vancouver Island.

The Queen Charlotte Islands are much smaller and less mountainous than Vancouver, no summits being reported as rising above 2,000 feet. Their southern end is of Queen Charlotte Islands.

rugged Palaeozoic rocks, but the northern part consists of gently tilted Cretaceous and early Tertiary sediments with much volcanic material. The later rocks contain beds of lignite locally transformed into bituminous or anthracite coal by neighbouring dikes of diabase. The north-westward extension of this island chain forms the narrow strip of mountainous shore and islands belonging to Alaska.

The true western boundary of the North American continent should be placed beyond the islands just described, where the edge of the continental shelf sinks rapidly towards the greater depths of the Pacific. The whole Pacific coast has undergone geologically recent changes of level, as shown by the deep fiords, once land valleys, on the one hand, and by raised beaches with marine shells on the other, reaching in places 290 or 300 feet above the sea. Whether the post-glacial rise continues slowly to the present is uncertain. These comparatively recent changes of level, however, are on a much feebler scale than those which must have accompanied the elevation of the successive mountain chains of the Cordillera, so that the bottom of the Pacific and the mountainous belt which has been thrust up beside it seem to be gradually settling down to a state of equilibrium.

The Saint Elias Range.

The mountains of the Cordillera proper are greatly surpassed in height by a comparatively small knob of mountains near the boundary of the Yukon Territory and Alaska beyond Lynn Canal and the White Pass. The north-western part of the international boundary follows a lofty mountain range near the Pacific coast from Mount Fairweather (15,287 feet high) to Mount St. Elias, where it turns north along the 141st meridian to the Arctic Ocean. The inland portion of this range with Mount Logan, a little to the north-east, forms much the loftiest part of Canada, since Mount St. Elias reaches 18,024 feet and Mount Logan 19,539. A little to the west in Alaska is Mount McKinley, over 20,000 feet high, the culminating point of North America. This group of lofty peaks represents, as shown by Suess, the junction of two great mountain trends, that of the Cordillera chains, running north-west, and that of the Alaskan peninsula, trending north-east. Mr. McConnell, of the Canadian Geological Survey, describes them as follows: 'The mountains and mountain ridges of this range are characterized by extreme boldness of outline. Steep slopes, precipitous cliffs, and high broken peaks and crests prevail. The larger streams have cut deep wide valleys back into the heart of the range, while the smaller ones are usually enclosed in narrow, steep-sided, and often impassable canyons. The central portion of the range and all the higher mountains are covered with deep continuous snow-fields, and glaciers, some of the first magnitude, are present everywhere.' Mount St. Elias was climbed by the Duke of the Abruzzi, an exploring expedition as carefully planned as for Arctic work being necessary for the purpose.

Mount Logan and most of the other mountains of the range are built of Palaeozoic rocks, but the lower ground to the east consists largely of comparatively recent volcanic rocks with some early Tertiary sediments.

Mount St. Elias was once reputed to be a volcano, but this was an error, and no volcano has been active within historic times anywhere in Canada so far as known, though a well-preserved cone, with a crater breached on one side by a short lava stream, has been found in the Yukon Territory.

Conclusion.

This survey of the physical geography of Canada began with Nova Scotia at the south-eastern corner of the Dominion, one of its oldest and lowest parts, and ends near its north-western corner with the most recent and also the loftiest mountains within its boundaries.

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Maps.

The Department of the Interior publishes sectional maps of 1 inch = 3 miles, roughly hachured, and smaller-scale compilations (1 : 500,000, 1 : 250,000) for parts of the eastern provinces. The Militia Department is extending its survey (maps 1 inch = 1 mile, contoured) over Quebec and Ontario. Railway surveys are numerous and especially valuable in the western mountain region, where also the work of mountaineer-explorers is particularly valuable. Geological surveys or reconnaissances are extensive.]

CHAPTER II

CLIMATE

By R. F. Stupart

General conditions.

THAT Canada, a vast territory which stretches east and west between the Atlantic and Pacific Oceans, with her most southerly point in the same latitude as Rome in Italy, and her northern boundary the Arctic Sea, should possess climates ranging from that of the warm temperate zone to that of the polar winter, is but to be expected. The great part which her topographical features, varying as they do between the widest extremes, play in placing these varying climates, in tempering or in increasing their heat or cold, is a striking consideration in the climatology of the country. Between the climates of the Pacific coast and of the western prairies is raised the lofty barrier of those mountain ranges which lie parallel to the coast. Temperatures upon the great plains of the west are influenced not a little by altitudes above the sea, varying from over 3,000 feet to less than 1,000 feet, while further to the east in Ontario, at a distance from the ocean where might be expected all the continental extremes of heat and cold, the Great Lakes temper and modify the climate. It should be remembered that the older provinces, with the exception of the northern and as yet unsettled portions of Ontario and Quebec, are wholly further south than the British Isles, and lie between the same parallels as France. British Columbia, the most western province, spread over 11° of latitude, and with an average width of 400 miles, is of a size which would alone lead to a diversity of climate, but when in addition to area we consider that the western boundary is the Pacific Ocean, and that the whole province is traversed by three lofty mountain ranges, it will be understood why the climatic conditions are varied.

British Columbi

Vancouver Island in the Pacific Ocean occupies somewhat the same position in relation to the American continent that Great Britain in the Atlantic does to Europe. The annual rainfall, as in all other parts of British Columbia, varies much with the orographical features of the country. Along the exposed western coast it is very great, at many points exceeding 110 inches, but in the eastern portion it is much less, and at Victoria and some other points does not greatly exceed 30 inches. This may be compared with the west and east coasts of the south of Great Britain. The rainfall is not distributed uniformly throughout the year, the summer months being dry and the autumn and winter months wet, whereas in England it is the spring months which are driest. There are usually a few snowfalls during the winter, but the snow does not lie for any length of time at low levels. The annual temperature curve is similar to that of England, the monthly values in winter being nearly the same as in the Midland counties, and the summer temperatures somewhat lower. The percentage of bright sunshine during the colder months is no greater than in England, but during the summer is distinctly higher, and may be correlated with the drier conditions.

Across the Strait of Georgia on the mainland at low levels, and especially in the lower Fraser River valley, the climate is closely similar to that of the island, with, however, a somewhat larger range of temperature, the summers being slightly warmer, and the winters, while mild, nevertheless liable to occasional moderate cold spells. Zero is scarcely ever recorded, and in most years the temperature does not fall lower than about 20° F. The annual precipitation is generally between 55 and 65 inches. Holly and ivy thrive here as on Vancouver Island.

The Interior Plateau.

The change in climate between the west and the east sides of the Coast Range is decidedly abrupt. The Pacific winds are deprived of much of their moisture in ascending the western slopes of the mountains, and the air flows eastward or is drawn down to lower levels, becoming drier and warmer. Hence the interior plateaus between the Coast and the Selkirk Ranges possess a relatively dry climate ; the summers are warmer and the winters colder than on the lower mainland. The cold of winter, however, is seldom severe, and the hottest days of summer are rendered pleasant by the fact that the air is dry and the nights are cool.

In the more southern districts the mean temperature of April corresponds very closely with that of the same month in England, while the summer is somewhat warmer than an English summer, and may well be compared with that of the southern portion of the Canadian province of Ontario, except that the air is much drier and the rainfall is scanty. There are areas within this upper country where the annual precipitation is less than 10 inches, notably in the Kamloops division, but over the greater portion of both Yale and Kootenay districts the precipitation is sufficient, and throughout the whole region irrigation, if desirable, is easily accomplished. The excellence of the climatic conditions of these interior valleys is well indicated by the success of fruit cultivation ; the grape, the peach, and the mulberry ripen early even on the higher benches, and tobacco is a profitable crop. In East Kootenay between the Selkirks and the Rocky Mountains, the winters are colder, and at times the temperature falls considerably below zero, but the spring sets in early, the summers are warm, and an annual

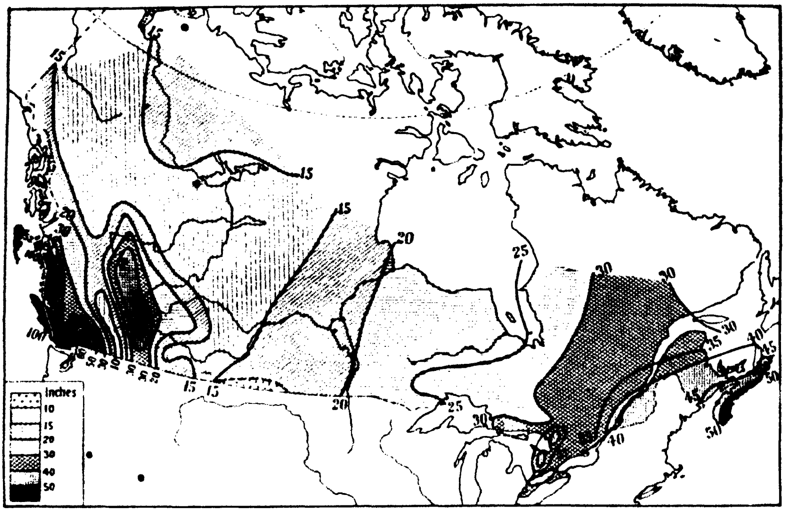

FIG. 3. Mean Annual Rainfall of Canada.

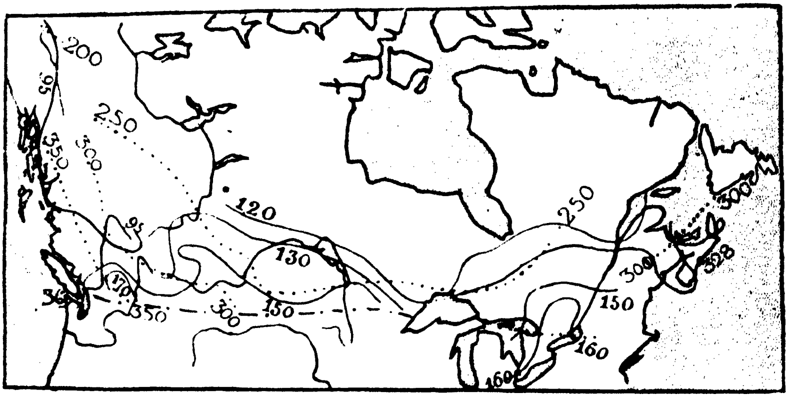

FIG. 4. Number of Days with Temperature above Freezing, dotted line; Number of Days above 60° F., continuous line.

precipitation of 18–20 inches in rain with a moderate winter snowfall affords sufficient moisture for agriculture.

Northern districts. In the more northern districts of the province the climate near the coast is distinctly wet, but mild withal. Observations at Port Simpson, not far distant from the present meteorological station at Prince Rupert, show an annual precipitation of 74 inches, an average January temperature of 34° and July temperature of 59°, temperatures not unlike those of parts of Scotland. In the interior plateaus, very generally at an altitude exceeding 3,000 feet, the climate becomes more severe with higher latitudes and increasing distance from the coast, but large areas are suitable for mixed farming and ranching.

Western provinces: Alberta, Saskatchewan, Manitoba. To the east of the Rocky Mountains, in what are usually termed the Western Provinces, the climate differs widely from that near the Pacific. The winters are much colder. Spring usually opens a little earlier in Alberta, near the mountains, and in south-western Saskatchewan, than it does further east in Saskatchewan and in Manitoba, but early in May the more eastern districts become the warmer, and the average temperature of the three summer months in Manitoba, taking Winnipeg as typical of the province, is some 5° higher than during the same season at Calgary and Edmonton. An average daily maximum temperature in April of 53° at Calgary, 52° at Edmonton, 58° at Medicine Hat, and 50° at Winnipeg, indicates very clearly that April is truly spring, and farming operations are well under way early in that month. The rapid upward trend of the temperature curve continues during May and June. Bright hot days may be confidently looked for during July and August, and very occasionally in these months temperatures exceeding 90°, perhaps over 100°, are recorded. Average mean maxima in July of 78° at Winnipeg, 76° at Qu'Appelle, 82° at Medicine Hat, 75° at Calgary, indicate a not unpleasant warmth, while the corresponding minima show that the nights are cool. A fact of peculiar interest, in connexion with the climate

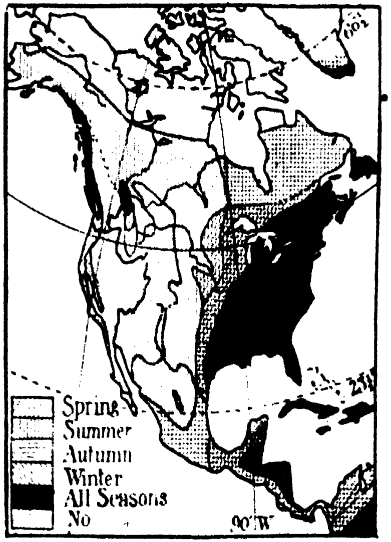

FIG. 5. General Distribution of Rain in North America.

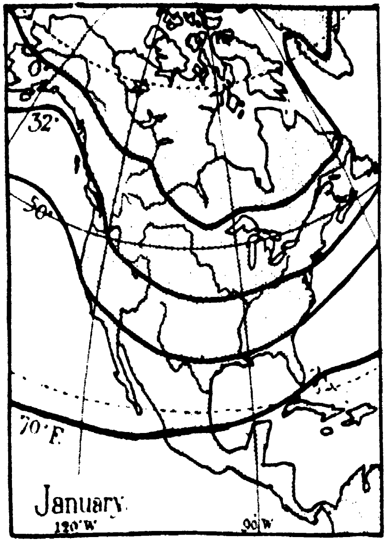

FIG. 6. January Isotherms of North America.

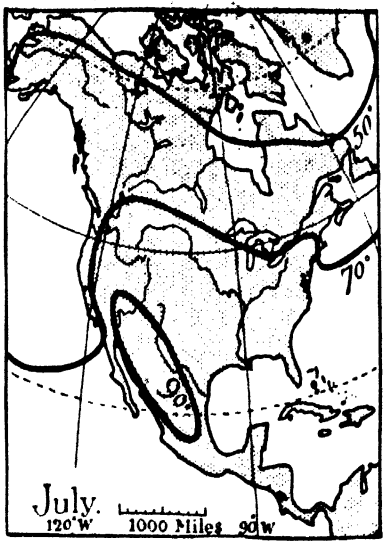

FIG. 7. July Isotherms of North America.

of the Western Provinces and territory to the north, is that the summer season in Athabasca and the basin of the great Mackenzie River is nearly as warm as in Alberta. At Edmonton and Calgary the mean summer temperature is 59°, and at Fort Simpson, in 62° N. lat., it is but 2° lower. While, however, the summers in the more northern latitudes are warm, the other seasons are not so, and a downward trend of the temperature curve is very noticeable after the middle of August.

Alberta.

Southern Alberta has a much milder winter than any other portion of the Western Provinces, and the cold becomes greater to the eastward over Saskatchewan and Manitoba and northward towards Athabasca and the Mackenzie River basin. Eastwardly from Alberta the average winter temperatures, December–March, are as follows: Calgary 15°, Medicine Hat 16°, Qu'Appelle 5°, Winnipeg 2°. Northward the change is even more marked, and in strong contrast to the small variation during the summer—Calgary 15°, Edmonton 12°, Dunvegan 1°, Fort Chipewyan - 7°, Hay River at the entrance of Slave Lake - 9°, Fort Simpson in latitude 62° N. - 13°, and Fort Good Hope, near the Arctic Circle, - 25°. Seeing that the winters are so cold in the far northern territories while the summers are warm, the time of the opening of spring becomes all-important, and the average date cannot be placed much before the end of April in the Peace River valley, and early May further north in the Mackenzie basin. All through April, however, the snow is melting fast, the temperature is frequently above 50°, and wild fowl are flying during the latter half of the month. Another feature of peculiar interest in connexion with the climate of the Western Provinces near the mountains, is the rapid changes of temperature, which in winter frequently occur in short intervals of time; also the marked variation in the mean winter temperature in different years, and the variation in rainfall during the summers of different years. The rapid changes in short intervals are accounted for and explained by the well-known Chinook or Föhn effect,

The Chinook.

which is met with to a greater or lesser extent on the lee of mountains, on the windward side of which moisture is precipitated. When a cyclonic area from the Pacific, moving across Northern Alberta, causes a rapid south-west and westerly flow of air across the Rocky Mountains, the Chinook blows over the western prairies. Sometimes a change of wind from north and north-east to south-westerly will connote in Alberta a rise of temperature from perhaps 20° below zero to 40° above in a few hours.

The variation in successive seasons is to a great extent, though not entirely, due to the varying position of the track of storm centres in different years. The average mean track for January, deduced from many years of observation, is across British Columbia. In some winters, however, the centres persistently move further south than in others, and pass into the continent over the States of Washington or Oregon. Then the Chinook does not blow east of the mountains in the Canadian provinces, where north-east and north winds prevail, accompanied by continued low temperatures. In other years the storm centres just as persistently move across northern British Columbia, and then the Chinook is the rule rather than the exception, and the weather under the lee of the mountain keeps mild. As an example of the variation of temperature in different winters, the mean temperature of January 1886 at Edmonton was −13·7°, while in 1889 it was 21·9°—a range of 35·6°. In February 1887 it was −10·4°, and in 1889 21·9°—a range of 32·3°. In November 1896 it was zero, and in November 1890 it was 38°.

Rainfall of the western provinces

The average annual precipitation over the larger portions of both Alberta and Saskatchewan is about 17 inches, of which 11 to 12 inches fall as rain and the remainder as snow. In the southern districts of the former province, and the south-western districts of the latter, the precipitation is somewhat less, and in some localities it is even below 13 inches, and here much of the snowfall is evaporated by Chinook winds, leaving the prairies bare of snow during a large part of the winter. Towards Manitoba the precipitation increases, and the mean annual amount for that province is about 19 inches; the heaviest, about 21 inches, occurring in the extreme eastern portion, and the least, 17 inches, in the more southern and western districts. A feature of pronounced importance in connexion with the precipitation of the Western Provinces is that in Manitoba fully 50 per cent., and further west 62 per cent., of the total amount falls between May and the end of August, affording ample moisture for the crops during the growing season.

Ontario.

Ontario, bounded on the west by Manitoba, on the north by Hudson Bay, and on the south by the Great Lakes, is spread irregularly over 15° of latitude and 20° of longitude. The climate of that portion of the province which lies north of Lakes Superior and Huron differs considerably from that of the part which lies east of Lake Huron and north of Lakes Erie and Ontario, especially in winter, when the former, in addition to lying further north, is less affected by the tempering influence of the Lakes. In the southern districts the vegetation makes rapid progress in April; before the end of the month the trees are partially in leaf, and at times temperatures of 70° and over are recorded. May is almost invariably a delightful month, with a mean temperature ranging between 52° and 55°, and by the last week all trees are in full leaf. The summer months are decidedly warm, with much sunshine and very few rainy days, most of the precipitation which occurs falling in showers or thunderstorms which give sufficient moisture to the rapidly ripening crops. With the cool nights of September come the first indications of autumn, but it is seldom that ground frosts occur until October, which month, with its superb weather and glorious autumn tints, is one of the finest of the year. November, with the shortening days, is often wet, but snow rarely falls until December, in which month the winter sets in with blustery weather and heavy snowfalls, sometimes followed by cold spells during which the temperature may fall to zero or lower. January and

February are truly winter and the ground is usually snow-covered. With March come signs of spring. In most years all snow has disappeared by the middle of the month and by the end the trees are beginning to bud. The annual precipitation throughout this portion of Ontario is a little over 30 inches, which is pretty evenly distributed over the various months.

Lake Superior —Hudson Bay region.

From the north shores of Lakes Superior and Huron to Hudson Bay the winters are distinctly severe, but as the accompanying tables for Moose Factory, Abitibi, and Haileybury indicate, the summers are warm. In January the mean temperature at Moose Factory is 25° lower and at Haileybury 15° lower than at Toronto, but as the spring advances, the differences become less, until in May they are respectively 10° and 2° lower, and by July, 6° and 2° lower.

At Moose Factory and Fort Hope, 300 miles to the westward, the average daily maximum temperatures for July and August are 74° and 70°, as against 77° and 73° at Haileybury, which latter temperatures are almost the same as those at Toronto in the same months. It will be observed, however, that in June the temperature is considerably lower in the north than at Haileybury and Toronto, and that the nights are cooler all through the summer. Temperatures of over 80° are not infrequent in Northern Ontario, and 90° or over is usually recorded once or more often in each summer. The total annual precipitation near Lakes Nipissing and Temiskaming is nearly the same as in southern Ontario, but northward this diminishes somewhat, the rainfall becoming less and the snowfall greater.

Quebec.

The province of Quebec comprises an enormous territory extending from the Ottawa and St. Lawrence valleys northward into unexplored Labrador and Ungava. The summers in the south-western part of the province are as warm as in southern Ontario, but are considerably cooler further east; in July the 70° isotherm passes not far south of Montreal, the 65° line passes through Quebec city, and most of the Gaspé Peninsula has a mean temperature something below 60°. The almost unsettled districts in the western part of the province lying north of the Ottawa River and extending to about 51° N. lat., have a summer quite as warm as that of northern Ontario and the Western Provinces, with an abundant rainfall and much bright sunshine. The winters throughout the province are cold, and between December and March the ground usually has a deep covering of snow.

Maritime Provinces.

The general character of the seasons in the Maritime Provinces corresponds very closely with that of western Quebec and southern Ontario. The spring, however, opens just a little later, and the summer is not quite so warm, but, as in Ontario, October is usually a superb month, and it is late in November or early December before snow falls. Reference to the tables will show that the annual temperature curve at Halifax is closely similar to that of Toronto, and that of Fredericton, N.B., is almost the counterpart of Montreal. The average annual precipitation of these provinces is between 40 and 45 inches, except along the southern coast-line of Nova Scotia, where it is nearly ten inches greater.

Ice and navigation of Great Lakes and St. Lawrence.

The Great Lakes never freeze over; but usually most of the harbours are closed with ice by about the middle of December, and remain frozen over until the end of March or beginning of April. The average date of the closing of navigation on the St. Lawrence River at Montreal is December 16, and of the opening, April 21. Harbours in the Gulf of St. Lawrence are likewise closed by ice during the winter months, but on the Bay of Fundy and coast of Nova Scotia they are open all the year round.

CLIMATIC TABLES

The average mean highest, mean lowest, and mean temperature; the highest and lowest temperature, and mean daily range; also percentage of bright sunshine and mean annual precipitation at various stations in Canada.

TABLE I

VICTORIA, B.C.

Latitude, 48° 24′; Longitude, 123° 19′

	Mean				Absolute		
	Highest	Lowest	Aver. Temperature	Daily Range	Highest	Lowest	Precipitation
January	41·9	33·1	37·5	8·8	56	−1	5·28
February	44·1	34·1	39·1	10·0	60	6	4·03
March	48·9	36·1	42·5	12·8	68	17	2·92
April	54·9	39·4	47·2	15·5	75	29	2·42
May	61·6	44·2	52·9	17·4	83	31	1·44
June	65·5	47·8	56·6	17·7	86	36	1·20
July	70·9	49·6	60·3	21·3	90	37	0·40
August	69·2	49·8	59·5	19·4	88	37	0·60
September	63·8	46·1	55·0	17·7	85	30	2·16
October	55·8	43·7	49·7	2·1	70	22	2·37
November	48·3	38·8	43·6	9·5	63	17	6·97
December	45·5	37·0	41·3	8·5	59	8	7·98
Year	70·9	33·1	48·8		90	−1	37·77

VANCOUVER, B.C.

Latitude, 49° 17′; Longitude, 123° 5′

	Highest	Lowest	Aver. Temperature	Daily Range	Highest	Lowest	Precipitation
January	40·1	32·5	36·3	7·6	55	2	8·83
February	44·7	32·6	38·7	12·1	58	11	6·79
March	49·9	35·3	42·6	14·6	61	15	4·90
April	56·1	38·1	47·1	18·0	79	28	3·42
May	62·5	44·4	53·5	18·1	86	33	3·60
June	67·7	48·6	58·2	19·0	88	36	3·28
July	72·8	52·7	62·8	20·1	90	43	1·23
August	72·1	51·9	62·0	20·2	92	41	1·47
September	63·9	46·0	55·0	17·9	82	30	5·49
October	57·6	42·3	50·0	15·3	69	23	5·48
November	46·7	36·0	41·4	10·7	74	15	10·09
December	44·1	35·1	39·3	9·0	58	22	7·84
Year	72·8	32·5	48·9		92	2	62·42

AGASSIZ, B.C.

Latitude, 49° 14′; Longitude, 121° 31′

	Mean				Absolute		Precipitation
	Highest	Lowest	Aver. Temperature	Daily Range	Highest	Lowest	
January	37·9	28·2	33·0	9·7	57	—13	7·29
February	43·5	31·7	37·6	11·8	64	—12	6·68
March	52·0	35·9	44·0	16·1	74	16	5·47
April	55·2	38·3	46·7	16·9	82	28	5·49
May	62·9	44·8	53·9	18·1	90	30	4·85
June	69·5	48·3	58·9	21·2	95	36	3·97
July	76·7	51·0	63·9	25·6	95	38	1·55
August	79·0	50·5	64·7	28·5	97	38	1·62
September	67·4	46·7	57·0	20·7	90	32	5·25
October	61·3	42·1	51·7	19·2	82	29	6·56
November	44·4	34·1	39·3	10·3	63	9	8·69
December	40·8	31·9	36·3	8·9	58	8	9·43
Year	79·0	28·2	48·9		97	—13	66·85

KAMLOOPS, B.C.

Latitude, 50° 41′; Longitude, 120° 29′

January	29·1	17·1	23·1	12·0	56	—31	0·94
February	34·1	19·6	26·8	14·5	64	—27	0·82
March	47·1	27·8	37·4	19·3	69	—5	0·39
April	61·1	37·4	49·2	23·7	84	22	0·37
May	70·1	45·9	58·0	23·2	100	26	1·01
June	76·4	51·6	64·0	24·8	101	35	1·26
July	83·4	55·8	69·6	27·6	102	42	1·32
August	81·7	54·6	68·1	27·1	101	38	1·01
September	69·5	46·4	57·8	23·1	93	30	1·01
October	56·4	38·3	47·6	17·6	82	16	0·53
November	41·7	30·0	35·8	11·7	71	—22	1·10
December	34·5	24·3	29·4	10·2	56	—16	0·79
Year	83·4	17·1	47·2		102	—31	10·55

VERNON, B.C.

Latitude, 50° 14′; Longitude, 119° 15′

	Mean				Absolute		Precipitation
	Highest	Lowest	Aver. Temperature	Daily Range	Highest	Lowest	
January .	34·3	16·6	25·4	17·7	56·0	−27·0	0·98
February	38·1	19·5	28·8	18·6	70·0	−30·0	1·09
March .	49·4	25·9	37·7	23·6	64·0	−3·0	0·76
April . .	64·1	34·9	49·5	29·2	80·0	18·0	0·51
May . .	73·2	41·4	57·3	31·8	91·0	24·0	1·23
June . .	74·0	46·9	60·1	27·8	97·0	30·0	1·66
July . .	82·1	50·1	66·1	32·0	101·0	36·0	1·30
August .	82·1	49·5	65·8	32·6	98·0	34·0	0·96
September	67·6	41·3	54·5	26·3	92·0	25·0	1·53
October .	56·5	34·1	45·3	22·4	76·0	15·0	0·66
November	40·9	25·8	33·4	15·1	65·0	−17·0	1·36
December	35·5	21·5	14·0	14·4	65·0	−4·0	1·24
Year	82·1	16·6	45·6		101·0	−30·0	13·28

NELSON, B.C.

Latitude, 49° 29′; Longitude, 117° 21′

January .	33·9	24·5	29·2	9·4	49·0	−6·0	2·80
February	32·7	21·2	27·0	11·5	54·0	−7·0	3·00
March .	40·6	25·6	33·1	15·0	62·0	9·0	1·78
April . .	56·1	35·6	45·9	20·5	76·0	20·0	1·58
May . .	65·3	41·4	53·4	23·9	84·0	29·0	2·49
June . .	73·9	48·0	61·0	25·9	91·0	34·0	3·31
July . .	81·1	51·9	66·5	29·2	94·0	41·0	1·76
August .	74·1	50·4	62·3	23·7	94·0	39·0	1·87
September	70·2	45·0	57·6	25·2	86·0	30·0	1·59
October .	54·1	34·4	44·3	19·7	75·0	20·0	2·81
November	42·2	32·1	37·2	10·1	55·0	2·0	2·88
December	38·2	34·6	36·4	3·6	49·0	8·0	3·31
Year	81·1	21·2	46·2		94·0	−7·0	29·27

PORT SIMPSON, B.C.

Latitude, 54° 34′; Longitude, 130° 26′

	MEAN				ABSOLUTE		
	Highest	Lowest	Aver. Temperature	Daily Range	Highest	Lowest	Precipitation
January .	39·5	27·8	33·6	11·7	63	−9	9·59
February	40·7	29·6	35·2	11·1	63	−10	7·19
March .	44·7	30·9	37·8	13·8	63	11	5·86
April . .	50·4	35·2	42·8	15·2	73	18	6·78
May . .	56·6	40·2	48·4	16·4	79	27	4·61
June . .	60·6	45·2	52·9	15·4	88	34	4·35
July . .	66·6	51·3	58·9	15·3	88	29	4·86
August .	63·9	49·5	56·7	14·4	80	31	6·78
September	59·2	45·2	52·7	14·0	74	30	8·04
October .	53·5	40·6	47·0	12·9	65	28	12·33
November	45·6	33·7	39·7	11·9	65	6	11·52
December	42·6	31·2	36·9	11·4	62	5	11·17
Year	66·6	27·8	45·2		88	−10	94·08

EDMONTON, ALTA.

Latitude, 53° 33′; Longitude, 113° 30′

January .	16·2	−3·2	6·5	19·4	56	−57	0·76
February	19·6	−1·3	9·4	20·9	62	−57	0·68
March .	33·9	10·9	22·4	23·0	72	−40	0·71
April . .	52·9	28·8	40·9	24·1	84	−10	0·79
May . .	64·8	39·0	51·4	26·8	90	11	1·78
June . .	69·9	44·3	57·1	25·6	94	25	3·19
July . .	73·7	48·3	61·0	25·4	94	33	3·39
August .	71·9	46·4	59·4	25·5	90	26	2·13
September	62·1	37·5	49·8	24·6	86	12	1·42
October .	61·1	34·5	46·8	26·6	82	−10	0·74
November	39·5	17·7	28·6	21·8	74	−44	0·59
December	20·7	8·3	18·9	21·2	56	−45	0·74
Year	73·7	−3·2	36·8		94	−57	16·92

CALGARY, ALTA.

Latitude, 51° 2′; Longitude, 114° 2′

	Mean				Absolute		Precipitation
	Highest	Lowest	Aver. Temperature	Daily Range	Highest	Lowest	
January .	23·1	1·6	14·4	21·5	58	−48	0·44
February	24·5	2·4	13·5	22·1	50	−49	0·56
March .	35·6	12·2	23·9	23·4	75	−34	0·74
April . .	53·2	26·8	40·0	26·4	78	−14	0·70
May . .	62·7	35·5	49·1	27·2	90	12	2·48
June . .	68·4	42·2	55·3	26·2	94	26	3·24
July . .	74·7	46·5	60·6	28·2	95	29	2·50
August .	70·2	44·8	57·5	25·4	95	28	2·52
September	63·7	36·7	50·2	27·0	89	15	1·17
October .	55·1	28·7	41·0	26·5	85	−8	0·48
November	36·3	14·8	25·6	21·5	70	−31	0·70
December	30·1	10·6	20·4	19·5	60	−39	0·56
Year	74·7	1·6	37·5		95	−49	16·15

FORT CHIPEWYAN, ALTA.

Latitude, 58° 43′; Longitude, 111° 10′

January .	−1·3	−19·9	−10·6	18·6	38	−55	1·07
February	0·9	−18·5	−8·8	19·4	42	−50	0·68
March .	15·5	−5·1	5·2	20·6	46	−49	0·57
April . .	39·3	18·5	28·9	20·8	69	−32	1·38
May . .	54·8	33·8	44·3	21·0	83	−14	1·60
June . .	64·8	43·4	54·1	21·4	88	+16	2·85
July . .	70·9	50·3	60·6	20·6	93	23	2·30
August .	67·6	46·1	56·9	21·5	85	23	3·30
September	53·2	34·8	44·0	18·4	78	10	2·47
October .	42·3	26·2	34·3	16·1	63	0	1·83
November	20·5	5·9	13·2	14·6	51	−31	1·29
December	6·4	−11·3	−2·4	17·7	42	−54	0·77
Year	70·9	−19·9	26·6		93	−55	20·20

REGINA, SASK.

Latitude, 50° 27′; Longitude, 104° 37′

	MEAN				ABSOLUTE		Precipitation
	Highest	Lowest	Aver. Temperature	Daily Range	Highest	Lowest	
January .	9·3	−9·9	−0·8	18·2	48	−54	0·65
February	9·8	−9·2	+0·3	19·0	52	−56	0·96
March .	24·4	4·6	14·5	19·8	68	−44	0·98
April . .	49·1	26·8	38·0	22·3	85	−20	1·11
May . .	62·7	37·9	50·3	24·8	99	7	2·08
June . .	71·9	46·9	59·4	25·0	102	23	3·48
July . .	76·1	51·0	63·6	25·1	107	31	2·65
August .	74·5	48·6	61·6	25·9	104	23	1·68
September	63·8	39·3	51·6	24·5	93	9	1·58
October .	50·8	29·8	40·3	21·0	87	−15	0·99
November	29·3	12·2	20·8	17·1	73	−47	0·97
December	17·8	−0·5	8·7	18·2	56	−55	0·61
Year	76·1	−9·9	34·0		107	−56	17·74

WINNIPEG, MAN.

Latitude, 40° 35′; Longitude, 97° 7′

January .	8·0	−13·3	−2·6	21·3	41·8	−46·1	0·96
February	11·1	−13·4	−1·2	24·5	46·0	−46·5	0·70
March .	26·2	3·0	14·6	23·2	61·8	−36·5	1·25
April . .	50·1	27·0	38·6	23·1	89·6	−12·8	1·51
May . .	64·2	37·8	51·0	26·4	93·6	14·0	1·91
June . .	74·2	49·9	62·1	24·3	100·5	21·0	3·62
July . .	77·6	54·0	65·8	23·6	95·8	35·5	3·33
August .	75·4	50·3	62·9	25·1	97·0	30·3	2·04
September	65·8	41·8	53·8	24·0	99·0	17·0	1·93
October .	51·8	30·9	41·3	20·9	84·8	−2·8	1·27
November	30·5	12·4	21·4	18·1	64·8	−33·4	1·16
December	16·8	−2·7	7·0	19·5	44·8	−39·1	0·74
Year	77·6	−13·4	34·6		100·5	−46·5	20·42

HAILEYBURY, ONT.

Latitude, 47° 29′; Longitude, 79° 39′

	Mean				Absolute		
	Highest	Lowest	Aver. Temperature	Daily Range	Highest	Lowest	Precipi
January	17·7	—4·3	6·7	22·0	48	—40	2·04
February	19·8	—2·9	8·5	22·7	47	—38	1·90
March	32·1	8·3	11·9	23·8	71	—34	2·23
April	48·3	26·3	37·3	22·0	79	—3	1·84
May	61·6	39·0	50·3	22·6	93	17	3·22
June	73·7	50·2	62·0	23·5	100	28	3·03
July	76·7	55·4	66·0	21·3	99	36	3·91
August	73·0	51·8	62·4	21·2	93	27	2·63
September	65·1	44·4	54·7	20·7	91	24	3·52
October	51·2	33·9	42·5	17·3	80	13	2·71
November	35·3	20·9	28·1	14·4	63	—25	2·25
December	21·0	3·2	12·1	18·2	47	—35	2·40
Year	76·7	—4·3	37·0		100	—40	31·76

ABITIBI, P.Q.

Latitude, 48° 43′; Longitude, 79°

January	12·5	—11·3	0·6	23·8	42	—46	1·85
February	14·2	—11·0	1·6	25·2	46	—44	1·45
March	28·2	1·6	14·9	26·6	62	—42	2·25
April	40·3	21·0	30·6	19·3	70	—20	1·43
May	54·6	36·4	45·5	18·2	94	8	2·86
June	67·9	49·3	58·6	18·6	94	28	2·67
July	72·6	55·5	64·0	17·1	94	35	2·77
August	68·9	52·3	60·6	16·6	86	34	2·85
September	60·2	44·7	52·5	15·5	87	26	2·60
October	47·2	32·1	39·6	15·1	76	15	2·96
November	31·1	18·2	24·6	12·9	68	—10	2·05
December	16·6	—1·4	7·6	18·0	48	—45	2·22
Year	72·6	—11·3	33·4		94	—46	27·96

MOOSE FACTORY

Latitude, 51° 16′; Longitude, 80° 56′

	Mean				Absolute		Precipitatio
	Highest	Lowest	Aver. Temperature	Daily Range	Highest	Lowest	
January .	8·1	—15·3	—3·6	23·4	43	—48	1·93
February	10·5	—14·8	—2·2	25·3	45	—48	1·01
March .	25·1	—3·0	11·0	28·1	57	—45	0·94
April . .	38·8	16·3	27·6	22·5	72	—29	1·33
May . .	53·0	31·8	42·4	21·3	95	—11	2·33
June . .	67·1	42·2	54·7	24·6	94	23	2·34
July . .	74·1	50·6	62·3	23·5	97	31	2·48
August .	70·3	48·3	59·3	22·0	96	32	3·24
September	61·6	41·9	51·7	19·7	91	24	2·92
October .	48·3	32·3	39·7	16·0	84	8	1·88
November	30·5	16·4	23·5	14·1	63	—27	1·19
December	13·9	—4·8	4·5	18·7	43	—41	1·47
Year	74·1	—15·3	30·9		97	—48	23·06

TORONTO, ONT.

Latitude, 43° 40′; Longitude, 79° 24′

January .	28·9	14·9	21·9	14·0	58	—26	2·90
February	29·6	14·5	22·0	15·1	54	—25	2·58
March .	35·6	21·4	28·5	14·2	70	—16	2·67
April . .	48·9	32·8	40·8	16·1	90	6	2·42
May . .	61·3	42·9	52·1	18·4	93	25	3·06
June . .	72·0	52·7	62·4	19·3	93	28	2·88
July . .	77·4	57·9	67·6	19·5	103	39	2·99
August .	75·6	57·0	66·3	18·6	99	40	2·87
September	67·5	49·9	58·7	17·6	94	28	3·27
October .	54·1	38·7	46·4	15·4	81	16	2·46
November	42·0	29·9	36·0	12·1	67	—5	3·09
December	32·2	19·6	25·9	12·6	61	—21	2·92
Year	77·4	14·5	44·1		103	—26	34·11

MONTREAL, P.Q.

Latitude, 45° 30′; Longitude, 73° 35′

	Mean				Absolute		Precipitation
	Highest	Lowest	Aver. Temperature	Daily Range	Highest	Lowest	
January .	20·7	4·4	12·5	16·3	52	—26	3·73
February	23·4	7·4	15·4	16·0	50	—24	3·07
March .	30·7	16·9	23·8	13·8	57	—15	3·99
April . .	49·0	32·8	40·9	16·2	77	8	2·24
May . .	64·0	45·8	54·9	18·2	92	25	2·95
June . .	73·7	56·4	65·0	17·3	98	38	3·53
July . .	77·4	60·8	69·1	16·6	94	40	4·29
August .	75·1	58·9	67·0	16·2	90	45	3·57
September	66·5	50·8	58·6	15·7	91	33	3·30
October .	52·9	39·0	46·0	13·9	68	22	3·13
November	38·7	26·6	32·7	12·1	78	—1	3·74
December	26·2	12·1	19·2	14·1	59	—21	3·65
Year	77·4	4·4	42·1		98	—26	40·99

QUEBEC, P.Q.

Latitude, 46° 48′; Longitude, 71° 13′

January .	17·9	3·0	10·5	14·9	51	—34	3·20
February	20·7	4·5	12·6	16·2	49	—32	3·06
March .	31·0	15·5	23·3	15·5	64	—18	3·26
April . .	45·4	29·6	37·5	15·8	80	2	2·03
May . .	62·5	41·0	51·8	21·5	88	21	3·15
June . .	70·9	51·5	61·2	19·4	90	32	4·30
July . .	75·6	56·3	66·0	19·3	96	39	4·40
August .	71·4	54·3	62·9	17·1	90	37	3·94
September	63·9	47·1	55·5	18·8	88	29	3·77
October .	50·0	36·1	43·1	13·9	77	17	3·09
November	35·7	33·9	29·8	11·8	66	—10	3·06
December	22·4	8·5	15·5	13·9	55	—27	3·16
Year	75·6	3·0	39·1		96	—34	40·46

FREDERICTON, N.B.

Latitude, 45° 57′; Longitude, 66° 36′

	Mean				Absolute		Precipitation
	Highest	Lowest	Aver. Temperature	Daily Range	Highest	Lowest	
January	23·3	2·8	13·0	20·5	52	−34	2·43
February	26·3	3·9	15·1	22·4	61	−30	3·76
March	35·2	16·0	25·6	19·2	65	−27	4·12
April	48·9	28·1	38·5	20·8	77	−4	2·59
May	63·2	39·9	51·6	23·3	92	24	4·23
June	72·2	49·1	60·6	23·1	97	32	3·64
July	75·9	54·4	65·2	21·5	96	38	3·79
August	73·6	53·5	63·5	20·1	95	39	4·18
September	65·5	44·9	55·2	20·6	88	25	3·21
October	52·3	34·4	43·3	17·9	82	15	3·93
November	41·7	24·9	33·3	16·8	64	−16	4·21
December	27·6	9·3	18·2	18·3	58	−31	3·62
Year	75·9	2·8	40·3		97	−34	43·71

HALIFAX, N.S.

Latitude, 44° 39′; Longitude, 63° 36′

January	30·9	13·1	22·0	17·8	55	−16	5·63
February	31·6	13·9	22·7	17·7	59	−17	4·94
March	36·5	20·8	28·7	15·7	55	−9	4·15
April	46·6	29·9	38·2	16·7	76	7	4·00
May	58·4	38·9	48·7	19·5	88	24	4·43
June	68·2	47·0	57·6	21·2	93	33	3·68
July	73·9	54·4	64·2	19·5	93	41	3·43
August	74·3	55·4	64·8	18·9	93	42	3·96
September	67·6	48·8	58·2	18·8	85	32	3·53
October	56·2	39·8	48·0	16·4	86	23	5·21
November	44·2	32·2	38·2	12·0	65	4	5·26
December	34·3	19·7	27·0	14·6	55	−11	5·52
Year	74·3	13·1	43·2		93	−17	54·74

CHARLOTTETOWN, P.E.I.

Latitude, 46° 14′; Longitude, 63° 10′

	Mean				Absolute		
	Highest	Lowest	Aver. Temperature	Daily Range	Highest	Lowest	Precipitation
January .	24·0	0·2	15·1	17·8	50	−27	4·06
February	25·3	7·0	10·1	18·3	47	−17	3·25
March .	31·3	16·0	23·7	15·3	53	−14	3·00
April . .	41·4	27·4	34·4	14·0	68	2	2·61
May . .	54·8	37·7	46·3	17·1	79	20	3·06
June . .	66·4	49·0	57·7	17·4	85	36	2·60
July . .	71·0	56·2	63·9	15·4	88	42	3·43
August .	72·2	57·1	64·7	15·1	88	44	5·96
September	63·7	49·7	56·7	14·0	82	34	3·53
October .	52·8	40·2	46·5	12·6	74	26	4·05
November	40·1	29·3	34·2	11·8	63	1	3·74
December	29·8	15·0	22·0	13·9	52	−18	3·08
Year	72·2	0·2	46·2		88	27	41·78

TABLE II.

PERCENTAGES OF SUNSHINE

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	YEAR
Victoria . .	20	28	39	45	42	48	60	58	49	35	21	15	38
Agassiz . .	18	23	27	30	32	33	46	44	34	31	10	15	29
Battleford .	40	49	50	52	44	47	52	54	44	44	34	31	45
Indian Head	31	36	35	40	44	42	55	50	40	34	26	25	38
Brandon . .	41	47	43	46	42	41	56	58	50	40	33	34	45
Winnipeg .	41	48	49	50	54	52	59	59	47	37	34	34	47
Haileybury .	35	40	41	46	43	55	53	54	44	34	18	20	40
Barrie . .	20	29	37	45	45	53	57	53	50	37	20	16	38
Toronto . .	27	37	40	47	48	56	60	60	55	44	29	24	44
Woodstock .	21	30	33	41	46	56	60	55	50	40	26	10	40
Lindsay . .	25	36	41	47	46	53	55	53	50	40	25	20	41
Ottawa . .	30	38	40	46	48	50	53	56	45	39	28	22	41
Montreal .	34	40	45	49	51	50	59	57	54	35	30	37	45
Quebec . .	30	36	41	40	41	44	46	50	42	37	24	27	38
Fredericton .	40	43	42	45	45	46	56	51	50	45	32	36	44

The Dominion Meteorological Service publishes a *Monthly Weather Review*, Toronto, 1905 seqq., and the Toronto Observatory *Annual Reports* contain results of meteorological, besides seismological and magnetic observations.

CHAPTER III

VEGETATION

BY PROFESSOR R. H. YAPP

As in other countries, the broad features of the vegetation of Canada depend primarily on climate. The lofty mountains of the west effectively intercept the rain-bearing winds from the sea: hence follows the existence along the west coast of a narrow strip with high rainfall (up to 100 inches). In the east there is a broader belt with a fairly humid climate, for not only are the mountains lower, but the presence of large bodies of inland water (e.g., Hudson Bay and the Great Lakes) to some extent neutralizes the effect of increasing distance from the sea. Between the humid areas of the east and west the climate is more continental in character, the precipitation decreasing both towards the interior and towards the north. Over the greater part of Canada much of the precipitation is in the form of snow, which in winter generally covers the ground for months together. In severe winters, a covering of snow is beneficial to plant life, as it not only keeps the soil warmer, but protects the vegetation from the injurious effect of cold, drying winds.

Climatic zones of vegetation.

Southern Canada lies within the cool temperate zone, the winters for the most part being cold, though the summers are usually hot. On passing northwards the mean annual temperature gradually falls, and the length and severity of the winters increase. In the northern portions of the Dominion, temperature plays an important part in imposing a limit to the possibilities of development of vegetation. These variations of humidity and temperature are accompanied by corresponding changes in the vegetation. Thus we find in

(a) *The Temperate Zone*, on passing from east to west: (i) an eastern or Atlantic forest region, extending to the

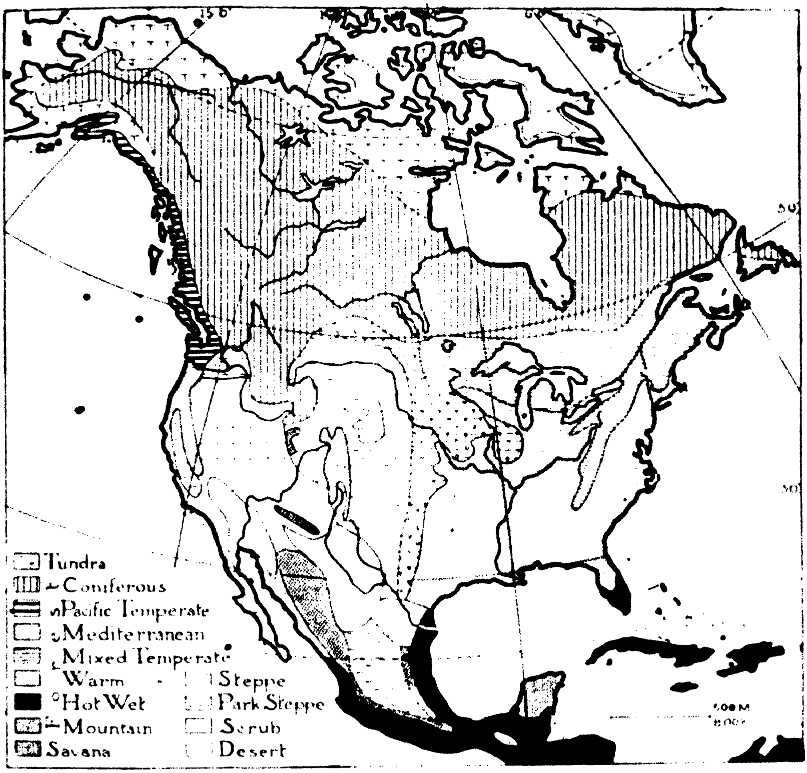

FIG. 8. Natural Vegetation of North America.

west of the Great Lakes, (ii) a central drier region of prairies, and (iii) a western or Pacific forest region.

(*b*) *The Sub-arctic Zone*, a vast, continuous area of coniferous forest, less luxuriant than the forests of the temperate zone. It stretches obliquely across the entire continent, from Newfoundland in the south-east, to Alaska in the north-west. North of this is—

(*c*) *The Arctic Zone*, occupied mainly by desolate stretches of treeless tundra.

The various forest regions may be considered first, then the prairies of the interior, and finally the 'barren grounds' of the frozen north.

Requirements of forest vegetation.

On account of their greater size and extent of surface, trees require more water than smaller plants, and are therefore more closely restricted in respect to the situations in which they can thrive. Their roots penetrate the soil to considerable depths, so it is the subsoil rather than the surface water which is important. Forests can flourish wherever the subsoil contains an abundant water-supply during the active growing season of the trees. In general, the greater the amount of water in the soil, the taller and more luxuriant the forest. But the amount of water necessary for tree-life increases with temperature, and forests are often found in colder regions where the rainfall is less than is required for the development of tree-vegetation in warmer climates. This explains in part the fact that while the prairies of southern Canada are treeless, the colder sub-arctic zone, much of which is similar in respect of precipitation and elevation, is covered by forest.

Forest trees belong either to the broad-leaved Dicotyledones, e.g. oak and other hardwood plants: or to the needle-leaved, generally evergreen Coniferae. The latter are the most generally useful timber plants, and include the pines, firs, spruces, &c., the wood of which is soft and uniform On the whole, conifers thrive in colder climates than dicotyledonous trees, so it is not surprising that most of the Canadian forests (especially in the colder north and on the mountain sides) are of the coniferous type.

The Atlantic forests.

Roughly, the Atlantic temperate forest region of Canada includes those parts of Quebec and Ontario which lie to the south of lat. 50° N.: westward it extends to the Lake-of-the-Woods. Most of the area belongs to the drainage system of the St. Lawrence and the Great Lakes. In contrast to the more southerly Atlantic forests of the United States, conifers are here the dominant trees, though many deciduous broad-leaved dicotyledones also occur. The latter are most numerous in warm, sheltered spots, especially on deep, well-drained soils. Under such conditions patches of deciduous forest may occur, though there is practically always an admixture of evergreen conifers. On the other hand, coniferous forest prevails in the more exposed areas, and on shallow or partly-drained soils.

A striking characteristic of the forests which surround the Great Lakes and the St. Lawrence is that they form a meeting-place for northern and southern plants. They contain many northern forms which here approach their southern boundary, as well as southern plants which find here their northern limit of distribution.

Of the characteristic conifers, the white and black spruces (*Picea alba* and *P. nigra*) occur on the cold and windy Atlantic coasts and on exposed mountain sides. The white or Weymouth pine (*Pinus strobus*), commercially the most valuable tree on the continent, was formerly abundant, especially on sandy soil at low elevations. This princely tree sometimes reaches a height of 150 feet. Other conifers are the tamarack (*Larix americana*), occurring on wet soils, the red pine (*P. resinosa*), hemlock (*Tsuga canadensis*), balsam fir (*Abies balsamea*), white cedar (*Thuja occidentalis*), &c. The dicotyledonous trees include maples (e.g. the sugar maple, *Acer saccharum*), elms, beeches, birches (e.g. the canoe birch, *Betula papyrifera*, the bark of which can be peeled off in large sheets, which are used by the Indians for many purposes), poplars, and many others. The trees are always accompanied by an attendant ground flora of mosses, ferns, and other humble plants.

The forests of the Great Lake region are justly famed for the richness and diversity of their autumn colouring. In this respect they are probably unsurpassed in the whole world. As autumn approaches, the sombre greens of the conifers form a perfect foil to the endless shades of purple, red, yellow, and brown of the broad-leaved trees, or the flaming scarlet of the sumachs and the wild vines.

Westwards the temperate forests thin out and are gradually replaced by the treeless prairies, while northwards they merge into the great subarctic forest described below.

The forests of the Pacific coast.

In British Columbia the complex Pacific cordillera, with its nearly parallel series of mountain chains, is some 400 miles in breadth. The high rainfall of the coast (in some parts as much as 100 inches) diminishes on passing eastwards through (consecutively) the Cascade, Gold, Selkirk, and Rocky Mountains. The abundant rainfall, together with the mildness of the climate, has resulted in the development along the coast of some of the most luxuriant forests of the continent. Trees of 200–300 feet in height often grow within a few feet of one another, while on the ground a dense carpet of mosses, ferns, and other plants luxuriate in the ever humid air and the perpetual shade cast by the forest giants. Not infrequently fallen tree-trunks may be met with piled on one another to a depth of 20–30 feet. Here they sometimes lie undisturbed and undecayed for centuries, a striking proof of the durability of certain of these western timbers. Further proof of this is afforded by the manner of growth of some of the trees. In the humid air of the forest, seedlings often establish themselves on the top of fallen trunks, sending down their roots to the soil below. Sometimes these seedlings grow into huge forest trees, which in turn may themselves perish, while the dead trunks on which they perched as seedlings, perhaps centuries before, still defy decay.

Conifers again are dominant, though broad-leaved trees, maples, cottonwoods, alders, &c., also occur, particularly in the valleys and along the river banks. In the south

PLATE XI (a). SCENE IN ALGONQUIN PARK, ONTARIO

PLATE XI (b). PENINSULAR LAKE, HUNTSVILLE, ONTARIO

(Office of the High Commissioner for Canada)

PLATE XII. SCENE IN STANLEY PARK, VANCOUVER, B.C.

(Office of the High Commissioner for Canada.)

the most important tree is the magnificent Douglas fir (*Pseudotsuga Douglasii*), which often reaches a height of 200–300 feet. Others are the cedar (*Thuja gigantea*), the coast hemlock (*Tsuga Mertensiana*), and the Menzies or Sitka spruce (*Picea Sitchensis*: cf. p. 176).

In other parts of the Pacific forest area the dominant species of conifers are different. Each species has its own geographical range, within which it is abundant or rare according as it is more or less perfectly adapted not only to exist, but also to compete with other species, under the prevailing local conditions of climate and soil. Thus on passing northwards along the coast, the Douglas fir, the cedar, and other species disappear, and the coast hemlock and Sitka spruce become the two dominant trees. In Alaska, still further to the north, even these give way as the Pacific forest, like the Atlantic forest of eastern Canada, encounters the vanguard of the subarctic forest belt. Similarly in the Rocky Mountains, though both the Douglas fir and the hemlock occur (the latter confined to the western slopes), the prevailing tree is *Picea Engelmanni*, *Pinus Murrayana* (lodge-pole pine) being also common. Again, as the mountains are ascended, different species are found at different altitudes. *Tsuga Pattoniana* (mountain hemlock), *Abies subalpina*, *Pinus albicaulis*, *Larix Lyallii*, &c., are among the prominent conifers at higher altitudes. Above about 4,000 feet the trees are more branched, and their trunks become dwarfed and contorted. The timber-line, or upper tree-limit, is reached in southern Canada at about 6,000–7,000 feet, but northwards it descends lower and lower, till in parts of Alaska it is only about 2,500 feet above sea-level. Between the tree-limit and the snow-line is a belt of dwarf alpine vegetation, many of the plants composing which are allied to those of the arctic regions.

The coastal valleys are frequently forest-clad like the mountains, but the valleys of the more eastern portions of the cordillera are drier, and often devoid of forest vegetation. The climax in this respect is reached in parts of the Fraser River valley, where the rainfall is small (about 10 inches), and a 'dry belt' of vegetation is found, consisting chiefly of a grey mantle of sage-brush (*Artemisia*).

The sub-arctic forest belt.

From Newfoundland and Labrador in the south-east to Alaska in the north-west, the boreal forest, interspersed with innumerable lakes and swamps, stretches diagonally in a bold sweep across the northern plains of the entire continent. It embraces the southern half of Hudson Bay, and extends along the Mackenzie River nearly to the Arctic Ocean; while on the south it unites the northern extremities of the great Atlantic and Pacific forests. Over 3,000 miles long, and averaging fully 600 miles wide, it is one of the most extensive continuous forests in the world. But owing to the low temperature of the growing season,[1] and the comparatively small precipitation, the forest is thin and poor, and the timber inferior. Towards the northern tree-limit, the trees are still more dwarfed and stunted, till finally the excessive cold of winter, coupled with the intense drying effect of the biting winds, determines the boundary beyond which no trees can grow at all.

In the main the forest is composed of only eight species of trees—a contrast to the more varied forests to the south. The trees are chiefly coniferous, with the black and white spruces (*Picea nigra* and *P. alba*) dominant. They and the Banksian pine (*Pinus Banksiana*)[2] are best developed on the uplands. The tamarack (*Larix americana*) inhabits the swamps, and the balsam fir (*Abies balsamea*)[2] the margins of lakes and rivers. The broad-leaved trees are mostly confined to the valleys: the chief are the canoe birch (*Betula papyrifera*), aspen (*Populus tremuloides*), which also forms a belt along the southern edge of the forest, on the borders of the prairies, and the balsam poplar (*Populus balsamifera*). Willows also are not infrequent. The undergrowth is scanty, and towards the north includes many arctic herbs.

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[1] The southern and northern boundaries of the subarctic forest lie roughly between the mean annual isotherms of 35° F. and 20° F. respectively.

[2] In the north-west portion of the forest belt, *Pinus Banksiana* is replaced by *P. Murrayana*, and *Abies balsamea* by *A. subalpina*.

Destruction of the forests. From the point of view of the lumber industry, the Atlantic and Pacific forests are far more valuable than the subarctic. But the reckless exploitation to which they have been subjected in the past, together with the appallingly frequent forest fires, have greatly diminished their value. It is true that in time the forests regenerate themselves, but in such secondary forest the valuable conifers are largely replaced by the comparatively worthless cottonwoods, aspens, and birches.

The prairies. The Canadian prairies are hemmed in on the east, west, and north by the three forest regions already described, while southwards they are continuous with the still more extensive American prairies. The rainfall is never great, and gradually diminishes from east to west, while summer droughts are not infrequent. The land rises from the low-lying, wheat-growing plains of Manitoba, to the dry, upland plateaux of Alberta, where stock-raising is the chief industry.

The prairies are vast, undulating, treeless steppes, covered with a dwarf grassy herbage. The general absence of trees is due, at least in part, to the inadequate water-supply. But other causes may co-operate, such as prairie-burning, which was formerly much practised by the Indians, in order to encourage pasturage for game. Grasses (family Gramineae) are the chief prairie plants, no fewer than 30 species being found. Two of the most characteristic are buffalo grass (*Buchloë dactyloides*) and grama grass (*Bouteloua oligostachya*). Mixed with the grasses are many dicotyledonous herbs, such as asters and golden-rods. On the low plains to the east, sometimes distinguished as the prairies proper, the herbage fairly completely covers the ground. But on the drier western plateaux it is more scanty, and consists largely of 'bunch grass', often with bare patches of soil between the tufts. The dry tufts persist during the winter, forming a nutritious self-cured hay, which used to constitute much of the winter food of roaming herds of bison. In the springtime the prairies are green and bright with flowers, but later the vegetation is parched by the droughts of summer to a more or less uniform yellowish brown, broken at intervals by the deep red of the 'alkali' patches. The latter are drainage hollows, with markedly saline soil. The vegetation is red in colour, and closely resembles that of maritime salt-marshes, many of the species (e.g. the glasswort, *Salicornia herbacea*) being identical.

Arctic tundra.

North of the subarctic forest belt are the 'barren grounds' of the arctic coastal plain. Here the scattered outposts of the dwindling forest have finally given way, to be succeeded by a desolate waste of frozen tundra, similar to that of Arctic Russia and Siberia. During the long, dark winters the ground is frozen to an unknown depth,[1] while the succeeding summers are too brief to do more than thaw out a few inches, or at most a foot or two, of the surface. Yet above this permanently frozen soil, a surface layer of dwarf vegetation maintains a precarious existence.[2] In the winter it is covered by a protective layer of snow, while in summer it is always wet and boggy, for natural drainage is hindered by the subterranean ice.

The vegetation is stunted, and consists mainly of mosses (e.g. *Polytrichum*) and lichens (e.g. *Cladonia rangiferina*, the reindeer 'moss'). But many flowering plants also occur, especially members of the heather family (*Ericaceae*), such as *Andromeda polifolia*, *Vaccinium Vitis-Idaea* (cowberry), &c. Other plants are the crowberry (*Empetrum nigrum*), the cloudberry (*Rubus Chamaemorus*), &c. It is interesting to notice that all the plants enumerated are European forms, and are indeed natives of the British Isles. This is true also of many other plants of the Canadian tundra. In fact the tundra plants form part of a great circumpolar flora, many of the species of which, being widely distributed in the far northern regions of both hemispheres, actually encircle the globe.

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[1] In some places cliff sections have shown 150–300 feet of ice.

[2] In southern Alaska the lowland forest occasionally extends on to the glaciers, growing luxuriantly on the surface moraines. This is an interesting parallel to the growth of tundra on ice-bound soil.

Bibliography

[See S. Brown, *Alpine Flora of the Canadian Rocky Mountains*, New York, 1907; G. H. Clark and J. Fletcher, *Farm Weeds of Canada*, Ottawa, 1903; J. W. Henshaw, *Mountain Wild Flowers of Canada*, Toronto, 1906; G. Johnson, *Report on the Forest Wealth of Canada*, Ottawa, 1895; J. Macoun, *Catalogue of Canadian Plants*, Montreal, 1883 seqq.; 'The Forests of Canada and their Distribution' in *Trans. Royal Soc. of Canada*, 1894; J. MacSwain, *The Flora of Prince Edward Island*, Toronto, 1907; H. B. Spotton, *Elements of Structural Botany with Special Reference to the Study of Canadian Plants*, Toronto, 1907; C. P. Traill, *Studies of Plant Life in Canada*, Toronto, 1909; *Reports* of the Royal Commission on Forest Reservation and National Parks, Toronto, 1893.]

CHAPTER IV

FAUNA

By Geoffrey W. Smith

Zoo-geographical position.

Canada forms the northern subregion of the Nearctic Region which includes Greenland as its northernmost limit and stretches southwards to about the level of the Gulf of Mexico. Owing to the rigour of the climate and the large tracts of barren land in the far north, there is less variety and wealth of life in Canada than in the more southern parts of North America; but an exception must be made in favour of the immense development of aquatic bird life on the northern coasts and the large inland lakes of Canada, while the occurrence of a considerable number of forms of life common to the north of Europe, such as the reindeer, Arctic fox, &c., which do not penetrate far south, adds an interesting variety to the fauna. The existence of this Arctic fauna common to Canada and northern Europe and Asia, which points to the occurrence in the past of a circumpolar continuous land area, making migration between the Old World and America possible for land animals, has led some naturalists to include Canada with the Palaearctic Region under the title Holarctic.

To some extent the distribution of the fauna in Canada corresponds to the vegetation areas; thus there are animals characteristic of the Barren Grounds or Tundra of the extreme north with its stunted vegetation, of the Forest Regions, of the Central Prairies, and of the Rocky Mountains.

In passing in review the more important of the Mammalia we shall notice some of the characteristic animals of these areas.

Mammalia: reindeer.

The reindeer occurs under two well-marked varieties, the woodland caribou (*Rangifer caribou*) and the Barren Ground caribou (*R. groenlandicus*). The woodland caribou, which ranges through the forest regions from New Brunswick to British Columbia, is characterized by rather low broad antlers and elevated nasal bones, and in this respect it agrees with the Finland and Siberian variety, whereas the Barren Ground caribou, which has high antlers and flat nasal bones, agrees more with the Greenland and Scandinavian forms. The Barren Ground caribou occurs on the Arctic coasts and islands and in Labrador. There is evidence that in Pleistocene times the reindeer ranged rather further south along the Rockies into the United States, and this has been ascribed to the influence of the glacial period ; but there is no evidence that there was a deep or extensive migration of the reindeer southwards or that it has ever been entirely driven from its subarctic home. There is some dispute as to the specific distinction between the varieties of reindeer that occur in the subarctic countries, but the most commonly received opinion is that there is only one true species with local races. The low antlers of the woodland race are probably an adaptation to prevent the animal being caught and entangled while passing through undergrowth and among the boughs of trees. In autumn the Barren Ground caribou migrates into the woodlands, but its herds never mingle with those of the woodland form.

Moose.

The moose (*Alces americanus*) has representatives in Asia and Scandinavia which are there known as elks. It has a similar range to the woodland caribou, being confined to the forest regions from Nova Scotia across the continent, skirting the Rockies to British Columbia and Alaska. As in the case of the caribou, there are records of its occurrence on the Rockies a little further south of its present range in Pleistocene times. The moose is the largest member of the deer family, and is remarkable for its immense spreading antlers, which form great laterally expanded basins. It has been greatly decreased in numbers owing to its being hunted both for sport and commerce.

Wapiti and Virginian deer.

The wapiti or Canadian elk (*Cervus canadensis*), which closely resembles the European red deer, has had its range very much diminished in historical times, as it used to occur all over the central and eastern parts of Canada as far south as Arizona, but now persists chiefly in the forests of the Athabaska and Peace River valleys, in Manitoba and Oregon. An interesting point in connexion with the wapiti is that it is closely related to the European deer and differs from the typical American deer, a relationship which is shown by the persistence of the lateral metacarpal bones, and in the branching of the antlers. The other Canadian deer, namely, the Virginian deer (*Cariacus virginianus*), occurring in the southern forest region, and the mule deer (*C. macrotis*) of west central Canada belong to the typical American deer which are represented by many species in North and South America, and are characterized by the antlers being either simple and prong-like, or else divided in a fork-like manner, with the anterior prong turning forwards and without a brow-tine.

Prong-horned antelope.

An animal of very great interest is the prong-horned antelope (*Antilocapra americana*), which inhabits the prairies of central Canada. This animal represents, together with a few fossil forms, a family by itself which has apparently never ranged outside the American continent. The horns, which are short and bifurcated, have a superficial resemblance to the antlers of a deer, but instead of being solid they are hollow like those of a goat. On the other hand, the horns are shed in autumn and grow again at regular intervals, like the deer's antlers. The horn also differs in structure and *formation* from the typical bovine horn in being formed of an agglomeration of hair. It is thus seen that the animal is not so much intermediate between the Bovidae and Cervidae as peculiar in itself, standing in much the same relation to the other ruminants as the giraffes.

Bison. Another prairie animal is the bison (*B. americanus*), now practically extinct in a wild state, though a few herds still linger in northern Canada and ih the reserve of Yellowstone Park. In the sixteenth century it was extremely abundant over about one-third of the North American continent, roaming all over the prairies in vast herds covering many square miles of country. The indiscriminate slaughter of these valuable animals which followed the introduction of firearms into the country and the exploitation of its natural resources does not reflect creditably either on the intelligence or humanity of civilizing man. The American bison differs from the European which still survives in Lithuania and the Caucasus, in that the latter is a forest dweller and associates in small herds.

Goat, sheep, musk ox. Of ruminants confined to the Rocky Mountains mention may be made of the Rocky Mountain goat (*Aplocerus montanus*) and the sheep (*Ovis montana*), while the musk ox (*Ovibos moschatus*), so called from the musky odour of its flesh, is characteristic of the Barren Grounds of Arctic North America and Greenland. The latter animal is intermediate in appearance between the sheep and ox, and represents a declining group which once ranged over northern Europe and Asia but is now extinct in these countries.

Carnivora. Of the carnivora, the puma (*Felis concolor*) occurs in western Canada, in the Rockies, and the forests of Quebec. This animal has an extraordinarily wide range on the American continent, occurring in South Patagonia and extending through the tropics of South America into the middle of Canada. The Canadian lynx and the wild cat are found in all the forest regions. The wolf occurs under several varieties—the grey wolf in the east, the black wolf on the Pacific coasts, and the white wolf in the

Barren Grounds and the north. Other Barren Ground carnivora are the wolverine (*Gulo luscus*), the Barren Ground bear (*Ursus Richardsoni*), and the Arctic and blue foxes (*Vulpes lagopus* and *fuliginosus*). The black or silver fox, which is so valuable on account of its skin, is a varietal form of the red fox which has a wide range in eastern Canada. The silver fox, which is bred artificially for its skin in Labrador, comes from the northern districts, especially from the upper reaches of the Mississippi and Missouri. The fur of this variety is nearly black, but has a silvery sheen imparted to it by the grey rings encircling the black hairs of the hinder half of the back, the head, and the thighs. The tip of the tail is generally white, but there is much variation in this and in the general coloration. The coyote or prairie-wolf (*Canis latrans*) ranges all over North America ; it lives in underground burrows. Of the smaller carnivores of general distribution mention may be made of the martens, weasels, ermine, mink, skunk, and otter. The raccoon (*Procyon lotor*) is not found in the north or on the prairies, being an inhabitant of the woodlands. It belongs to a family now confined to America with one exception, the panda of the Himalayas.

Bears.

The commonest bear in Canada is the comparatively harmless fruit-eating black bear (*Ursus americanus*) ; the really formidable grizzly (*U. horribilis*) is now practically confined to central British Columbia and the Rockies. The polar bear is confined to the coasts of the Arctic Ocean and Labrador.

Rodents.

The rodents are well represented ; especially characteristic of the north and the Barren Grounds are the lemmings, lemming voles, and gophers. Some of these ground rodents are peculiar to northern Canada ; for instance, the lemming voles (*Synaptomys*) and the jumping mice of the genus *Zapus*, which, however, has one representative in China and is related to the jerboas. Other rodents such as the Arctic hare and the banded lemming (*Dicrostonyx torquatus*) are circumpolar in distribution, being found in Greenland, northern Europe, and Asia, as well as in Canada. The beaver (*Castor fiber*) is apparently the same species as the north European form, though the Canadian races are far more architectural in their habits than the almost extinct Old World races. The American beaver has been very much persecuted since the advent of the white man ; at the time of the discovery of America it had an immensely wide range from Alaska and Hudson Bay to California and Arizona, but it now only survives in numbers along the Rockies, in the upper waters of the Fraser and Peace Rivers, and along the watershed between the Hudson Bay rivers and the St. Lawrence.

A genus absolutely confined to America is represented by the musk-rat or musquash (*Fiber zibethicus*), which makes subterranean burrows in the banks of streams and lakes, ranging from the Mackenzie River to Labrador. There are numerous squirrels and spermophiles or gophers in Canada. The latter are typical circumpolar forms, being mostly found in the colder regions of the northern hemisphere. The so-called prairie-dogs (*Cynomys*) are a more typical American group, though they are allied to the marmots of the Old World. Their rather inappropriate name is due to the barking sound which they are said to emit. There are three species of prairie-dogs, the common (*C. ludovicianus*), found on the open plains to the east of the Rocky Mountains, the Columbian (*C. columbianus*) on the west of the Rockies and at a higher elevation than the preceding, and the Mexican form (*C. mexicanus*).

Porcupines. There are two porcupines in Canada, *Erethizon dorsatus*, from the Atlantic coast to the Mackenzie River, and the yellow-haired porcupine (*E. epixanthus*) with a more western distribution. These porcupines differ from the Old World forms in being essentially forest-dwellers and tree-climbers, and it appears that they are a characteristic American group developed within and confined to that continent.

Birds. There is a very rich avifauna in Canada, especially in the numbers of individuals representing some of the species. This is notably the case in the water-fowl, such as various kinds of duck, geese, and waders of many species which breed in millions on the north coasts and on the numerous lakes of northern Canada, such as the Great Slave Lake, and migrate southwards in the autumn. Besides these, the coasts abound with sea-birds such as auks, guillemots, divers, and gulls.

The birds of prey include the golden eagle and numerous hawks ; the American vulture just reaches to the extreme south of Canada. The wild turkey, which was formerly plentiful in southern Ontario, is now practically if not quite extinct ; of other gallinaceous birds, the ptarmigan and partridge are plentiful. The woodpeckers, as is natural in a country pre-eminent for forests, are well represented, but curiously two groups of Old World birds, the true starlings and the flycatchers, are absent. Of ornamental birds, mention may be made of the tanagers, a family confined to America, the humming-birds, several species of which visit Canada, one penetrating into Alaska as far north as Mount St. Elias ; these, too, are entirely confined to America. The so-called robin, which has become semi-domesticated in Canadian towns, is really a thrush. Pigeons are restricted to the more southern parts of Canada.

Certain groups of birds are interesting as showing the route of migration by which so many Old World animals have entered America. The nutcrackers, for instance, go right across Europe and Asia ; they are then found on the other side of Bering Straits on the Pacific coasts of America, but they do not penetrate further east. The warblers, which also stretch right across northern Europe and Asia, just enter Alaska but have not spread over the American continent.

Lower vertebrates and invertebrates.

Of the reptiles and amphibia of Canada not much need be said, only three families of reptiles and eight of amphibia being represented. Rattlesnakes, the only deadly form of reptile, are confined to southern Canada, not reaching much north of the parallel drawn to Vancouver. The five other snakes and three tortoises which are limited to Canada are principally found in the southern regions; while in the north only frogs and toads and a salamander of the genus *Plethodon* occur, as far north as Hudson Bay.

Fishes, &c.

The marine fish, which afford the material for a very large industry on both the Atlantic and Pacific coasts, are dealt with in the special sections dealing with British Columbia, Newfoundland, &c. (pp. 174, 101, 282); the great abundance of salmon and trout and of white fish (*Coregonus*) in the lakes and rivers of Canada are also an important natural resource.

The great lakes of Canada and the United States have some of the features of so-called relict lakes, i.e. lakes which have at some time been either continuous with an arm of the sea or more probably in close connexion with the sea by means of estuaries. Thus in Lakes Michigan and Superior the shrimp *Mysis relicta* occurs, which is also found in some Scandinavian and Irish lakes, but is clearly a derived marine form, and the same is true of the Gammarid Crustacea *Pontoporeia*, and of the fish *Triglopsis thompsoni*.

The distribution of the freshwater crayfish in North America is interesting as pointing to two routes of migration; the genus *Canbarus* having spread from the southern states in a north-easterly direction into southern Canada; while the genus *Astacus* has evidently spread from Asia across a land bridge spanning Bering Straits, and is now found along the Pacific coasts west of the Rockies.

Many genera of butterflies appear to have pursued this latter route of migration. Thus the genera *Parnassius*, *Colias*, *Coenonympha*, *Erebia*, and *Oeneis*, are all north European and Asiatic forms which have spread into North America across Bering Straits, and many of them have not penetrated right across to the east of the continent and Greenland, while all are absent from Iceland.

Origin of fauna.

It is clear that there are at least two distinct elements in the Canadian fauna, a typical American fauna which has on the whole spread northwards from the south of the continent and is not closely related to the Palaearctic species, and an intrusive circumpolar fauna containing many species which range in the northern countries round the pole and are still represented in the Palaearctic Region. To recapitulate the most striking genera of Holarctic distribution among the mammalia we may mention the following: *Cervus*, *Rangifer*, *Alces*, *Bison*, *Ovis*, *Gulo*, *Mustela*, *Lemnus*, *Ursus*, and *Vulpes lagopus*. An obvious connexion between the Palaearctic and Nearctic Regions is across Bering Straits, and the distribution of many species makes it clear that this bridge for migration between the two continents has existed in comparatively recent times. It has also been held that an Atlantic connexion was also established through Greenland and Iceland with Scandinavia, but though this is highly probable, it cannot be held that the advocates of this view have completely proved their case. Another disputed point is the influence which the Glacial Period has exerted upon the North American fauna, a problem which recurs with many identical features in the Palaearctic Region. Did the Glacial Period drive all the northern fauna southwards from the circumpolar countries, and have they again recently returned there, or have they always persisted in their present habitats despite the supposed rigours of the glacial epoch? The evidence in North America is rather in favour of the latter supposition, since there is no evidence that the northern types ever extended their range southwards much beyond their present distribution; while the fact that so many identical species are common to the Palaearctic and Nearctic Regions is evidence in favour of the view that these regions have been inhabitable and in direct connexion during the Pleistocene period.

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CHAPTER V

ECONOMIC SURVEY

REGIONAL DIVISION—THE EASTERN REGIONS

BY PROFESSOR JAMES MAVOR

INTRODUCTION

Economic regions.

THE Dominion of Canada may be divided into the following economic regions, each of these deriving its specific character from the predominant occupations of its people:

1. *The Eastern Fishing, Lumbering, and Mining Region*, comprising the river valley and the Gulf of the St. Lawrence, together with the Atlantic coast; in other terms, the Maritime Provinces almost as a whole, the greater part of the province of Quebec, and a portion of northern Ontario. The boundaries of this region are approximately the Atlantic coast on the east, 46° N. lat. on the south, 95° W. long. on the west, and 52° N. lat. on the north.

2. *The Eastern Agricultural and Industrial Region*, comprising the cultivated portions of the Maritime Provinces, and of the provinces of Quebec and of Ontario. In the latter provinces the cultivated areas extend along the left bank of the St. Lawrence, and along the valleys of its tributaries within the Canadian borders.

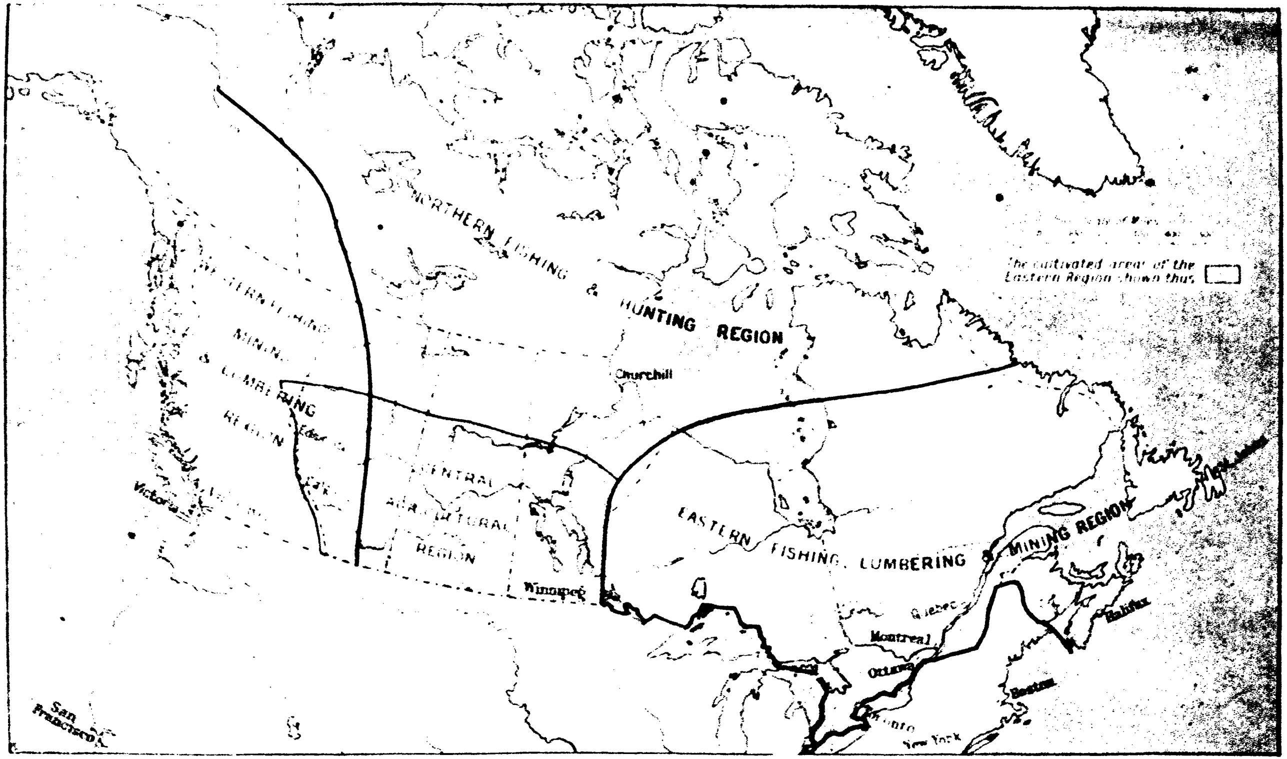
NORTHERN FISHING & HUNTING REGION
WESTERN FISHING MINING & LUMBERING REGION
CENTRAL AGRICULTURAL REGION
EASTERN FISHING, LUMBERING & MINING REGION
The cultivated areas of the Eastern Region shown thus
Churchill
Winnipeg
Victoria
San Francisco
Quebec
Montreal
Ottawa
Toronto
New York
Boston
Halifax

FIG. 9. Economic Regions of Canada.

3. *The Central Agricultural Region,* extending from the Red River Valley to the Rocky Mountains, and from the Canadian-United States boundary at 49° N. lat. to about 56° N. lat.

4. *The Western Fishing, Mining, and Lumbering Region,* comprising the western portion of the province of Alberta, the whole of British Columbia, and the southern portion of the Yukon Territory, and extending from 49° N. lat. to about 65° N. lat., and from the Rocky Mountains to the Pacific Coast.

5. *The Northern Fishing and Hunting Region,* extending from the regions of permanent settlement northwards to the Arctic Circle, and from the coast of Labrador to the Pacific, and to the Alaskan boundary. This vast region is sparsely inhabited by indigenous nomadic tribes engaged in fishing and hunting for their own support, and for exchange with the fur-trading companies, and with individual whalers and traders who visit some parts of the region.

THE EASTERN FISHING, LUMBERING, AND MINING REGION

Fisheries.

The fisheries of the Atlantic coast of Canada fall naturally into two divisions—the deep-sea and inshore fisheries extending from the Bay of Fundy to the coast of Labrador, and the fisheries of the estuarine and inland waters of the provinces of Quebec, Nova Scotia, New Brunswick, and Prince Edward Island. These fisheries taken together are of the annual value of about £2,500,000.

Settlement of disputed jurisdiction.

Two important disputes regarding jurisdiction have affected the administration of the fisheries. These were the dispute between the United States and Great Britain acting in the interests of Canada, and the dispute between the Dominion and the provincial governments. The first dispute was settled by a decision of the Hague Tribunal on September 7, 1910, after having endured for nearly a hundred years; the second was partially settled by a decision of the Judicial Committee of the Privy Council in 1898, after having endured practically since the confederation of the provinces in 1867. The claim of Great Britain to the right to make regulations for the control of the North Atlantic fisheries was found by the Hague Tribunal to have been established, and the claim of the provinces to the right to impose taxes upon fishery licences was found by the Privy Council to have been established.[1] The right of the Parliament of Canada to enact fishery regulations was of course not affected by the former dispute and decision; but it was affected by the latter.

In accordance with the provisions of a treaty between Great Britain and the United States signed at Washington April 11, 1908, an International Fisheries Commission was appointed for the purpose of framing a code of regulations and recommendations. Difficulty has been experienced in securing the sanction of the Senate of the United States to regulations agreed upon by the Commissioners. The existing regulations so far as Canada is concerned are contained in an Order in Council of September 12, 1907, and subsequent amending orders.

Fishery regulations and services.

The Dominion Government maintains a fisheries protective service, while the governments of the respective provinces appoint the fishery inspectors. The Dominion

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[1] On the North Atlantic fisheries dispute, see section under that title by James White, Secretary of the Commission of Conservation, Canada, in *Lands, Fisheries, and Game, Minerals*, Ottawa, 1911, p. 67, a volume issued by the Commission. See also correspondence respecting occurrences at Fortune Bay, Newfoundland, in January 1878, Parly. Paper North America No. 3 (1878), C. 2184; further correspondence respecting the same, United States No. 1 (1880), C. 2717; further correspondence ditto, E. S. No. 1 (1881), C. 2757; further correspondence ditto, U. S. No. 2 (1881), C. 3159, London (years stated). Canada-Newfoundland correspondence relating to settlement of claims arising out of transactions at Fortune Bay and elsewhere, C. 3762, London, 1883; correspondence respecting the Newfoundland fisheries, United States No. 1 (1906), C. 3262; Message from the President of the United States (Mr. Roosevelt), December 17, 1902. See also R. McFarland, *A History of the New England Fisheries*, University of Pennsylvania, 1911, an admirable account of the North Atlantic fisheries. A copy of the award of the Hague Tribunal in the fisheries dispute is printed in the appendix. On the dispute between the Dominion and the provinces see *Correspondence, Reports of the Ministers of Justice and Orders in Council upon the subject of Dominion and Provincial Legislation 1867–95*, Ottawa, 1896, &c.; A. H. F. Lefroy, *The Law of Legislative Power*, Toronto, 1897–8; and *Canada's Federal System*, Toronto, 1913.

Government grants bounties to fishing-boats (of between 10 and 80 tons burthen), to an amount of about £30,000 annually. In 1889 a fishery intelligence bureau was established with head-quarters at Halifax, Nova Scotia; but in 1911 this bureau ceased to exist. Its functions, however, continued to be exercised by the Department of Marine and Fisheries, by which there was issued, from April 1911, a monthly bulletin of sea-fishery statistics. These statistics are collected by the fishery overseers in the several districts, and are collated by the Department. The Meteorological Department of the Dominion, with head-quarters at Toronto, receives weather reports twice daily from all stations in Canada and the United States, and issues a daily chart. It also issues telegraphic forecasts and warnings to its various stations, and answers inquiries in the same manner. Forecasts are posted on bulletin boards at the fishing ports. In 1899 a biological station was established at St. Andrews, New Brunswick, the result of co-operative effort by the Dominion Commissioner of Fisheries (Dr. Prince) and the Universities of Toronto and McGill (Montreal). Much valuable work on the fauna of the Atlantic coast has been accomplished at this station.[1]

Politics and the fisheries.

The fisheries of Canada are among the most important assets of the country, yet their productiveness has been gravely compromised by the conflict of jurisdictions to which allusion has been made, as well as by the short-sightedness of the fishing population on the one hand, and the anxiety of the politicians to placate the fishermen on the other. This has led to the intrusion of politicians and their nominees into a field which can only be safely occupied by disinterested experts. The ruin of the lobster fishery[2] and the serious depletion and probable final extermination of the oyster beds[1] are heavy offsets against the advantages of local autonomy. The fault does not lie so much in the law as in the administration of it. So long as the fishery inspectorship is occupied or controlled by local politicians its inefficiency may be taken for granted.

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[1] Reports of the work done at the three biological stations, St. Andrews, N.B., Nanaimo, B.C., and Georgian Bay, Ontario, have been collected and published in three volumes, Ottawa, i. 1901, ii. 1907, and iii. 1912. These volumes contain thirty-nine scientific papers. See especially the paper on The Chemistry of the Medusae’, the result of researches during several seasons at St. Andrews by Professor A. B. Macallum, in *Journal of Physiology*, vol. xxiv, pp. 213-41.

[2] ‘Report of Lobster Fishery Commission, Ottawa’ and ‘The Lobster

Fishing vessels and conveyance of fish to markets.

The characteristic boat engaged in the Atlantic deep-sea fishing is a schooner of about 40 tons burthen. Up till about 1910 the trade was carried on by means of steamers, owned or chartered by the fish merchants, which went out to the fishing-grounds, relieved the fishing-boats of their catch, and then steamed for the market ports. Under this system the fishermen were more or less at the mercy of the merchants; and, moreover, very large quantities of fish caught by Canadian fishermen were carried direct from the fishing-grounds to the ports of the United States, and entered there. Since 1910, however, the advent of the internal combustion motor has gone far to revolutionize the fishing industry. The fishermen, by adopting the motor as an auxiliary, have become able to convey their catch themselves to the market ports, to sell it at the price of the market, and return to their fishing-grounds without material loss of time.

The economic reactions which this change produced were a diminution in the number of boats engaged in the deep-sea fishing, an increase in their size, a diminution in the number of fishermen employed at sea, and an increase in the number of persons engaged on shore in connexion with the handling, canning, and packing of fish. The fisherman has now a choice of markets, and

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Fishery of Canada', by W. A. Found, Superintendent of Fisheries for Canada, in *Sea Fisheries of Eastern Canada*, Ottawa, 1912, p. 50 (report includes discussion by members of the Commission).

[1] See 'Report on Oyster Culture', by Ernest Kemp, oyster expert, in *Annual Report of the Department of Marine and Fisheries, 1911–12*, Ottawa, 1912, p. 343 *seq.* *Sea Fisheries of Eastern Canada*, Ottawa, 1912, p. 155; 'The Canadian Oyster Industry,' by M. T. Patton, assistant secretary of the Commission of Conservation, in *Lands, Fisheries, &c.*, Ottawa, 1911, p. 128 *seq.*

has thus become in effect independent of the merchant, from whom he formerly purchased his supplies and to whom he was practically compelled to sell his fish. The tendency towards the debt dependence of the fisherman upon the merchant has thus been checked, probably in the long run to the advantage of both.

Principal fish taken.

In the Nova Scotia fisheries cod forms the bulk of the catch, amounting to about two-thirds of the total of the chief kinds of fish. Haddock takes the next place, then herring, pollack, and hake, and then mackerel and halibut. In the New Brunswick fisheries the herring catch amounts to about three-fifths of the total, and cod to about one-seventh to one-eighth. On the coasts of Nova Scotia and in the Bay of Fundy herring are caught for bait in order to supply the American, Canadian, and Newfoundland fishermen on the Banks, and also for the sardine trade. About the end of May, the mackerel appear off the south-west coast of Nova Scotia; they go eastward along the coast to Canso, and then turn northward, entering the Gulf of St. Lawrence either through the Gut of Canso or by the east coast of Cape Breton Island. The herring make their appearance near the island of Grand Manan in July, and remain in that region until September. Late in the autumn and in the winter 'other schools of herring swarm into the mainland about Campobello Island and the waters between Point Lepreaux, New Brunswick, and Eastport, Maine'.[1] The pollack grounds lie to the north and west of Campobello Island, the mud-hake grounds lie to the east, and the wolves haddock grounds further to the north-east. These grounds are fished by fishermen from New Brunswick and also from the State of Maine. The offshore fishing grounds of the Nova Scotian fishermen lie between Sable Island and the coast of Nova Scotia. The principal deep-sea fisheries are on Banquereau, the Bank of St. Pierre, Green Bank, and the Grand Bank of Newfoundland. The season lasts from April till October, the fish moving slowly northward as the season advances.[2]

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[1] McFarland, op. cit., p. 8.

[2] McFarland, op. cit., pp. 9–10.

On the coasts of Nova Scotia, New Brunswick, and Prince Edward Island, lobsters are trapped in great numbers, so great indeed that speedy exhaustion of the grounds has been predicted by high authorities. Oysters are obtained chiefly round the coasts of Prince Edward Island. The Fisheries Department of the Dominion facilitates the culture of oysters by the distribution of seed oysters, and by planting them on the public beds. Proposals have been made from time to time to lease 'barren' areas to private persons for oyster culture.

Nova Scotian sealers.

The fishermen of Nova Scotia are not exclusively engaged in inshore and deep-sea fishing off their own coasts; sealers occasionally go from St. John to the South Atlantic. Their catch of oil during these voyages is usually landed at Montevideo or some other South American port.

Game fish of Atlantic waters.

The rivers of the Maritime Provinces are celebrated for the excellent sport for which they offer opportunity. Numerous pamphlets, issued by the provincial governments and by the railway companies, invite the sportsman to tempt the salmon (*Salmo salar*) of the Restigouche, or the speckled trout (*Salvelinus fontinalis*) of many rivers throughout the region. Nor is less sport obtainable from the striped bass (*Roccus lineatus*) of the Atlantic tidal waters. This fish attains a size of 15 to 40 lb.[1] While the visiting sportsman need find no difficulty in obtaining permission to fish in the inland waters on payment of the provincial licence fee, large areas of these waters are leased to clubs, which undertake the preservation of the fish, and provide more or less luxurious club-houses for their members. They also provide guides and canoes, which are necessary in unorganized and unsettled regions.

Breeding of fur-bearing animals in captivity.

Fur-bearing animals have been bred in captivity for some years in Prince Edward Island and in Nova Scotia. The industry concerns itself chiefly with foxes. In

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[1] See 'Game Fisheries of Quebec', by E. T. D. Chambers, in *Land, Fisheries, &c.*, cited above; and *Rod and Gun in Canada*, Woodstock, Ont.

Prince Edward Island a large amount of capital has been sunk in the breeding of the silver fox; the high price of the fur of that animal having stimulated the production. The Prince Edward Island fox-ranchers do not breed for fur, but for exportation of foxes to other places where they are bred for the fur market. The profits of the industry seem to be large; but it has assumed a speculative phase, and there is a probability of the supply outrunning the demand unless the number of foxes in the breeding establishments is kept within the limits determined by the market, which being dependent upon fashion is peculiarly liable to fluctuation.[1] Experience of similar experiments has shown also that diseases, to which the fox may not be liable in a wild state, may have their victims when the animals are kept in close quarters.

Forest policy and forest reserves in the Eastern Region.

Under the British North America Act, the care of the forest lands of the Crown devolves upon the provincial governments. The Dominion Government established in 1898 a small Forestry Branch of the Department of the Interior, and the Dominion Commission of Conservation, founded in 1909, takes cognizance of forestry questions, although not in an executive capacity. The latter especially is serving a useful function in publishing scientific papers on forestry, and in giving the aid of its advice as well as in co-operating with the provincial authorities when it is invited to do so. In 1898 there does not appear to have been employed in any of the provinces a single educated forester.[2] Since that date the province of Quebec has established a Forestry Department; the University of Laval (Quebec) has offered courses in forestry, and a Forest Rangers' School has been established by the provincial government. The University of Toronto and Queen's University (Kingston) have established faculties of forestry, and the provincial government of Ontario has appointed a forestry expert to advise on forestry questions. Until 1909 timber limits were exposed for sale to the highest bidder, the limits being sold for a lump sum. In that year the method of sale was altered. The limits are now customarily sold at a certain price per thousand feet of lumber. In certain cases a fixed sum is required to be paid before work is undertaken, and the lessee is required to divide the cleared land into 160-acre lots and to secure settlers for these lots.

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[1] Cf. Conservation Commission, *Fur-Farming in Canada*, by J. Walter Jones, B.S.A., Montreal, 1913.

[2] Inaugural address by the Hon. Clifford Sifton at the first annual meeting of the Commission of Conservation at Ottawa, January 18, 1910. *First Annual Report of Conservation Commission*, Ottawa, 1910, p. 18.

Forests of Quebec and Maritime Provinces.

The province of Quebec has nominally set apart 2,000,000 acres as forest reserves; but lumbering goes on in about one-half of that area. The remaining million acres are practically reserved. The forest area of Quebec and the Maritime Provinces is so vast that it has never been surveyed in such a manner as to provide exact data of its extent or value. From time to time reconnaissances are made into it, which yield provisional results.

Forests of Ontario.

The forest area of Ontario has been well worked over and has now been almost wholly surveyed. There are extensive reserves in Algonquin Park in Ontario proper, and also at Temagami in Northern Ontario. The province has established a nursery for forest trees at St. William on Lake Erie. Re-afforestation by planting, however, plays a comparatively small rôle in the question. The policy has now been established of leaving certain areas which have already been cut over or burned over to recuperate by natural seeding, and to close these for lumbering purposes until the areas in question gradually come to be re-afforested. By these means it is hoped that the supply of timber may be maintained. Availing itself of the right of the provinces to impose export duties, the province of Ontario imposes a duty upon logs when cut for export as logs.

Timber trees: extent and value of the eastern forests.

The composition of the forests of the eastern region of Canada is similar to that of the corresponding region in the United States. The forests consist of hard woods (birch, maple, and elm principally) with conifers intermingled. The hardwood forest of southern and western Ontario has almost disappeared under the axe of the woodman and the farmer. In many places the stumps still stand in the fields, or the roots form the characteristic fence of the pioneer's farm. Of the conifers, white pine abounds through the whole of the Eastern region, although there is now little good white pine timber in Ontario south of Georgian Bay.[1] Taking the region as a whole, and including the greater part of the province of Ontario which is or was in forest, the total area of the Eastern Forest region may be placed approximately at 390,000 square miles.[2] The proportion of the timber remaining upon this area, which is commercially valuable, has not been ascertained. Even if it were ascertained for one period, forest fires, cutting, and growth together alter the forest values continually. The loss by fire in the Eastern region is incalculable. Fires of great or small magnitude occur annually. Such fires are caused by lightning, by sparks from locomotives, and perhaps more frequently by the carelessness of hunters or other campers or of lumbermen or even of forest fire rangers, who leave their camp fires to smoulder and to be fanned into flame by wind. Measures are taken to prevent the great national loss which such fires occasion, but with qualified success. The forest area is so great and the population within it and on its margins is so scanty that the subject is one of great difficulty.[3]

Lumbering and transport.

In all parts of the world where timber is cut for transportation in logs to distant places, the modes of operation are very similar. In Canada the trees which are to be cut down are marked by the cutters, and then, when the ground is hardened by frost and the winter roads can readily be made from the depths of the forest to the nearest lake or river, the lumbering camps are formed and the lumbermen begin their round of operations. The trees are sawn almost through, usually by a saw worked by two men. The last strokes are often made with an axe, and if the operation has been done with judgement, the tree falls precisely in the designed direction. A large gang of men then remove the branches, and the trunk is forthwith sawn into such lengths as may be required, according to the purpose for which the timber is intended. Very large logs, or logs chained together end to end, are frequently hauled along the ice-covered trails or upon skidways. Smaller logs are placed upon sledges and hauled by horses upon the frozen surface. When thaw comes in the spring, the river drivers' business begins. When a river with a rapid current is available, it affords the simplest means of transportation. The logs, usually branded with the mark of the owner, are committed to the stream. When the river passes through a narrow gorge, the logs often become jammed, and sometimes miles of the river above the jam are filled with logs arrested by the obstruction below. To remove the jam is the dangerous business of the river drivers. With spiked poles in their hands they go out upon the logs and manœuvre them dexterously until the key of the jam gives way and the whole mass is carried along, sometimes very suddenly and with great violence. At difficult places, where obstructing rocks block the channel and render jams of frequent occurrence, chutes of timber are built by means of which the logs are guided to the less difficult natural reaches. If the river flows into a lake, the logs are collected at the river mouth by means of a boom of logs chained end to end. When a sufficient quantity of logs has filled the receptacle formed by the boom, the ends of it are closed, and the mass of logs loosely floating but confined to the boom becomes what is known as a 'bag' and is towed to its destination. On the greater navigable rivers the logs are formed into rafts in which the logs are fastened together. Hardwoods having greater specific gravity than the lighter conifers are usually attached to pine logs in the 'bag'. The saw-mills are sometimes at a considerable distance from the 'limits' or places where the timber is cut. Sometimes the logs are exported without being cut into lumber.

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[1] Cf. B. E. Fernow, *A Brief History of Forestry in Europe, the United States, and other Countries*, Toronto, 1907, p. 355.

[2] Fernow, *op. cit.*, p. 350.

[3] See Conservation Commission, *Forest Protection in Canada, 1912*, by Clyde Leavitt, M.Sc.F., Chief Forester of Commission, Toronto, 1913.

Mining. Classification of coal deposits in the Dominion.

The coal deposits of the Dominion of Canada may be classified as follows according to the formation in which they occur:

Lower Carboniferous or Devonian, represented by the Cannel and oil shales of the Arctic islands, and by the thin, and probably not economically exploitable, coal-seams in some parts of Nova Scotia, lying beneath the carboniferous limestone.

Carboniferous, represented by the principal coal-fields of Nova Scotia.

Lower Cretaceous, represented by the bituminous coals and anthracite of the Rocky Mountains and of the interior of British Columbia as well as by those of Queen Charlotte Islands and the Yukon Territory.

Middle and Upper Cretaceous, represented by the coals of Vancouver Island and of Lethbridge.

Upper Cretaceous, represented by deposits in Alberta and Saskatchewan.

Tertiary, represented by small areas in British Columbia, Yukon, and the Arctic Islands, and consisting of lignite and sub-bituminous coals.

Interglacial beds, represented by lignites of inferior quality and of lignitic and peat deposits, some of which are still in process of formation.[1]

From an economic point of view, Canadian coals have been classified in four series, according to the proportion of carbon contained by them.

Class A. 90 to 95 per cent. Class B. 70 to 90 per cent.
,, C. about 70 per cent. ,, D. 45 to 65 per cent.

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[1] Cf. 'The Coal Fields and Coal Resources of Canada', by D. B. Dowling, in *The Coal Resources of the World*, Toronto, 1913, vol. ii, p. 439. These valuable volumes contain the results of an inquiry made upon the initiative of the Executive Committee of the Twelfth International Geological Congress. The reports of which the volumes are composed are official. See also *An Investigation of the Coals of Canada with reference to their Economic Qualities: as conducted at McGill University, Montreal, under the Authority of the Dominion Government*, in six volumes, Ottawa, 1912 (a valuable series of monographs).

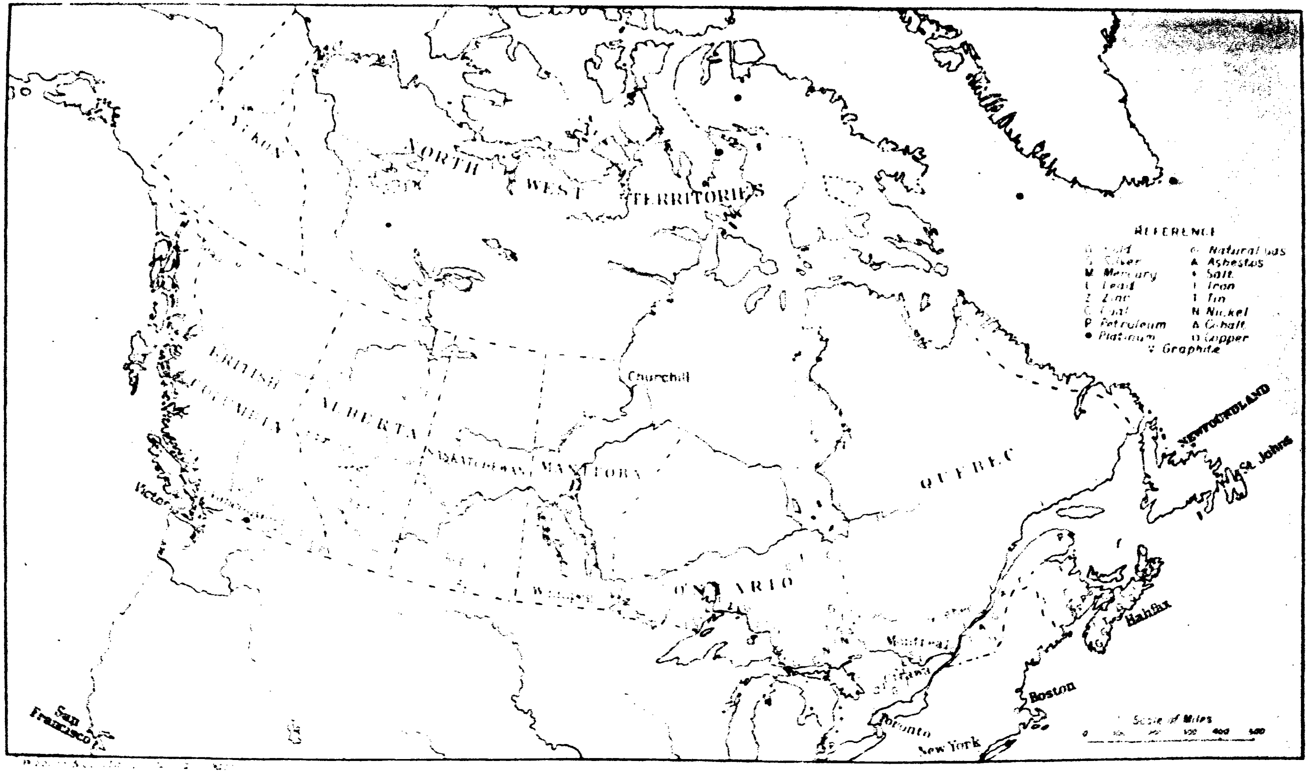

FIG. 10. Distribution of Economic Minerals in Canada.

Class C includes those coals which, while moderately strong in carbon, yield a high percentage of volatile matter on distillation and burn with a smoky flame.[1]

Extent of Dominion coal-fields. The total area and quantity of actual reserves of coal, calculated upon the actual thickness and extent of the deposits in the Dominion of Canada including the Arctic islands, is stated at 26,219 sq. miles and 414,804 million metric tons. The total probable reserves are approximately calculated at one and a quarter million millions of tons. Of this quantity, about 86 per cent. is in the province of Alberta, about 5 per cent. in Saskatchewan and Manitoba, about 7 per cent. in British Columbia, about 1 per cent. in the Yukon, North West Territories, and the Arctic islands, and about 1 per cent. in Nova Scotia, New Brunswick, and Ontario.[2]

Eastern mining region: Nova Scotia. The 'actual reserves' of Nova Scotia extend over 174·31 sq. miles and amount to two thousand million tons. The quantity already mined is estimated at sixty million tons. The fields are in five areas, all of which include important mines—Cumberland, Pictou, Inverness (chiefly submarine), and two areas at Cape Breton, one land and one submarine.[3] The principal mines are now in the possession of the Dominion Iron and Steel Company, and of the Nova Scotia Steel Company. The other mines are worked by independent companies. In 1909 a serious strike, accompanied by riots followed by the dispatch of troops, took place at Glace Bay in connexion with the mines of the Dominion Coal Company. The strike was occasioned by a dispute in which the provincial (Nova Scotian) workmen's organization and the United Mine Workers of America (one of the international trade unions) were involved. The strike lasted for several months and then gradually collapsed, many of the strikers leaving the district.

Iron mining. Iron exists in the Eastern region; but owing to various causes, its exploitation has not been successful. Under the influence of bounties and of protection many smelting plants have been established in Ontario and in Nova Scotia; but the percentage of Canadian ores treated in these furnaces has diminished. Thus in Ontario, the proportion of Ontario ores to the total quantity treated in the blast furnaces in Ontario in 1901 was 56 per cent.; while in 1911 it amounted to only 7 per cent.[1] The iron smelted at the works at Sault Ste. Marie is chiefly imported from the United States, and that smelted at Sydney, Cape Breton, is imported from Newfoundland.

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[1] *The Coal Resources*, &c., vol. i, pp. x–xiii. Classification by the Committee.

[2] *The Coal Resources*, &c., vol. ii, p. 442.

[3] *Ibid.* ii, 443.

Gold mining.

Although gold has been discovered in several different and widely distant parts of the Eastern mining region, the district which has been most productive is Porcupine in northern Ontario. In this region gold-bearing veins have been discovered for the most part in the Keewatin, one of the members of the pre-Cambrian or Archaean Shield. Since the Keewatin consists largely of eruptive rocks the fissures are irregular, and thus the distribution of gold associated as it is with quartz solutions which have circulated through these fissures, is irregular also. 'Most spectacular showings occur on many properties, but these are limited to portions of the veins.'[2] Warnings against excessive optimism have frequently been issued by the Bureau of Mines. In this camp as in others expensive plant has occasionally been installed without sufficient previous investigation of the local possibilities. Forest fires have been very destructive. Thus in May 1911 the surface workings and the buildings of the Hollinger mine were completely destroyed. The fire continued for nearly two months to ravage the district and to destroy the surface plant and the mining towns. During this terrible time seventy-one persons lost their lives. The opening up of the Porcupine field has led to prospecting throughout the neighbouring regions as well as to the re-opening or renewed activity of fields which had previously been worked and abandoned.

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[1] *Report, Bur. Min.* (Ontario), 1912, p. 28. On the history of the bounties upon iron see S. J. McLean, *The Tariff History of Canada*, Toronto, 1895, and E. Porritt, *Sixty Years of Protection in Canada*, London, 1908.

[2] A. G. Burrows, 'The Porcupine Gold Area', in *Report of Bureau of Mines, 1911*, Toronto, 1911, p. 20.

Silver mining: Cobalt region.

Silver had also been discovered in several parts of the Eastern region; but although some of the deposits were very rich, their extent was limited. In the autumn of 1903, announcement was made of the discovery of silver in a new region, destined afterwards to become famous as the Cobalt mining camp. During the construction of the Temiskaming and Northern Ontario Railway, which had been undertaken by the provincial government for the development of northern Ontario, deposits of silver ores and of cobalt-nickel arsenic ores were found. The discoveries were not made by prospectors but by employés of the contractors for the railway, nor was their importance at once realized. In 1904 the district was examined by Mr. W. G. Miller, acting as geologist for the Ontario Bureau of Mines.[1] In June 1905 the rush of prospectors into the district began; and from that date the Cobalt region was subjected to rapid exploitation. Canadian, American, and English capital poured into the district. Mining towns grew up, agencies of banks were established, and a large mining population speedily collected.[2]

According to Mr. W. G. Miller, the Cobalt deposits 'occupy narrow, practically vertical fissures or joints, which cut through a series of usually slightly inclined metamorphosed fragmental rocks of Lower Huronian ages'.[3] These rocks consist of three series, viz. 'the conglomerate and other sediments of the Cobalt series, the Nipissing diabase sill, and the Keewatin complex. But 80 per cent. of the ore has come from the Cobalt series.

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[1] Report on 'Cobalt-Nickel Arsenides and Silver' in *Rep. Bur. Min.* (Ontario), 1904, pp. 96–104, and on 'The Cobalt-Nickel Arsenides and Silver Deposits of Temiskaming', by W. G. Miller, *Rep. Bur. Min., 1905*, Part II, Toronto, 1905.

[2] In the sub-district of Coleman in 1901, there was not one person; in 1911 there was a population of 3,131 (2,351 males and 780 females) or 94·42 persons per sq. mile (*Census of Canada, 1911*, vol. i, p. 82). Coleman contains the town of Cobalt and most of the mines.

[3] *Report of Bureau of Mines, 1905*, Toronto, 1905, p. 7.

The chief reason for this greater productiveness is due to the fact that these rocks fractured more readily than did the diabase or the Keewatin.' The slenderness of the veins is compensated[1] by their number in respect to the area. Thus, although the veins are very unequally distributed, they are sufficiently numerous to make Cobalt an exceptionally rich silver-mining region.[2]

Economic effects of the opening up of new mining regions.

The economic effects of an influx of people and of capital into a previously unoccupied country extend widely beyond the region in question. The provision of supplies for a mining camp is a profitable business, for the need of supplies is urgent. Miners' wages are high, not only because labour is scarce, but because any one may go prospecting for minerals. This counter-attraction to farming exercises influence over a wide area; thus supplies are usually brought from a distance. The local markets of Ontario were denuded of their eggs, butter, vegetables, &c., for the new mining region, and the local prices of many commodities already advancing from other and more general causes were driven upwards rapidly under the influence of the suddenly increased demand.[3]

The speculative public had recovered from the disastrous experience of investment in the mines of British Columbia in 1896-7, and they plunged into the Cobalt market with energy. Mining lands were sold and leased by the government, which derived a large revenue from these payments and from mining royalties;[4] as well as from the government railway which had been constructed into the region prior to the important mineral discoveries. Capital was thus diverted from agriculture and from industries other than mining, and credit was employed to obtain capital from the United States and from Great Britain for the exploitation of the mines. Although the precarious character of mining enterprise rendered losses inevitable, and although the precise amount of capital which has been actually expended upon wages, supplies, and machinery for the development of the Cobalt region cannot be determined with precision, it is probable that the yield of the successful mines has already approximately replaced the capital outlay, taken as a whole. The number of successful mines, however, is small in proportion to the number of the prospects and mines upon which capital has been raised and in general, no doubt, expended.

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[1] *Report of Bureau of Mines*, vol. xix, Part II, 4th edition, Toronto, 1913, p. 123.

[2] The quantity of fine silver produced in Cobalt and the adjacent areas was as follows, stated in millions of ounces—1910, 30·6; 1911, 31·5; 1912, 30·2. Ibid. p. 35.

[3] See Statistical Tables and Diagrams in *Wholesale Prices in Canada, 1890–9. Special Report*, by R. H. Coats, Ottawa, 1910, and subsequent reports.

[4] The Ontario government derived from these sources in 1910 about £200,000, and in 1911 about £160,000. Cf *Rep. Bur. Min.*, 1912, p. 42.

Copper mining.

Practically the whole of the copper produced from mines in the Eastern region is derived from the nickel-copper ores of the Sudbury region. The total quantity is from 7,000 to 10,000 tons annually.[1]

Nickel mining.

The nickel ores of Sudbury in Ontario appear to be situated on the edges of a single sheet of eruptive rock in a basin enclosed by rocks of Lower Huronian and Laurentian ages. Nickel-bearing ores are distributed irregularly over these edges, and they may extend beyond them.[2] The first important work in the region was carried on by the Canadian Copper Company in 1886. In 1902 this company was absorbed by the International Nickel Company. Nickel ore mining and smelting are now carried on not only by the pioneer company, but also by Messrs. Vivian of Swansea, by the Dominion Mining Company, by the Mond Nickel Company, by the Dominion Nickel Copper Company, and by some smaller concerns. The total amount of nickel recovered from this region up till 1911 is stated by Prof. Coleman at about 133,000 tons, the total amount of ore mined being five and a half million tons.[1] The ore is smelted at the works in the region, and the resulting bessemer matte is exported for refining in the United States or in Wales.

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[1] *Rep. Bur. Min.*, vol. xxi, Part I, p. 26.

[2] Cf. A. P. Coleman, *The Nickel Industry, with special reference to the Sudbury Region, Ontario* (Report to Dominion Department of Mines), Ottawa, 1913. See also Barlow, 'Nickel and Copper Deposits of the Sudbury Mining District,' in *Reports, Geological Survey of Canada*, Part H, vol. xiv, Ottawa, 1904; Coleman, in *Rep. Bur. Min.* (Ontario), vol. xiv, Part III, Toronto, 1905, and A. Gray, 'The Nickel-Copper Industry of Ontario,' in *Mining World*, vol. xxxii, Nos. 20–2 (1910).

Other metals and minerals

The Huronian rocks contain a great diversity of metals. Besides those already mentioned, zinc, arsenic, and cobalt are produced to the extent of an average annual value of about £35,000 in the aggregate. In reducing the silver ores cobalt must be isolated. Since the demand for it is slender, the mine owners have been obliged to allow the metal to accumulate. Palladium and tungsten have long been known to be present in the Huronian, and the presence of mercury was determined in 1911.[2]

Clay for brick and tile making, stone and cement for building purposes, asbestos and mica for fireproof packing, &c., corundum for cutting and polishing, petroleum in the form of oil, and natural gas for heating and lighting purposes are among the abundant minerals in Ontario, the exploitation of which is vigorously conducted. Coal is absent. In 1896 specimens of a mineral, to which the name of anthraxolite had been given by the late Professor Chapman,[3] were brought from the Sudbury district and were described by the newspapers as coal. Some time elapsed and many experiments were made before the public were convinced as to the nature of the material. It was described by the late Dr. G. M. Dawson and by Prof. Coleman as a bitumen from which most of the volatile matter had been removed by metamorphic action.[4] Chemical analysis showed that relatively to anthracite the material had a small percentage of carbon and a large percentage of incombustible ash.

Three minerals only need be further noticed in this place. The exploitation of each of them has assumed considerable proportions. These are corundum, petroleum, and rock salt.

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[1] Coleman, *The Nickel Industry*, p. 107.

[2] *Rep. Bur. Min.* (Ontario), 1912, pp. 6 and 50.

[3] Professor E. J. Chapman, *Minerals and Geology of Ontario and Quebec*, p. 143.

[4] A. P. Coleman, 'Anthracitic Carbon or Anthraxolite,' *Bulletin Bur. of Min.* (Ontario), Toronto, November 1896, p. 6.

Corundum.

The corundum region of Ontario is in the central portion of the southern part of the province. It comprises the counties of Renfrew, Frontenac, Lennox, Hastings, Haliburton, and Peterborough. The occurrence of corundum in this region was first reported by Mr. W. F. Ferrier in 1896.[1] The mineral chiefly consists of aluminium oxide (Al_2O_3), but there are also usually present oxides of other metals which impart to it sometimes a striking iridescence. It crystallizes in long and narrow rhomboids; a cross section has six sides.[2] These crystals are found embedded in a felspathic matrix. On the surface they are slightly altered to mica. Corundum is not fusible before the blow-pipe, but it dissolves slowly in borax and phosphor salt. Next to the diamond it is the hardest known substance. Gems of corundum are of very rare occurrence; but mineral suitable for abrasive purposes is abundant. It is used together with emery powder or separately for grinding and polishing; and facets of corundum set on the periphery of iron disks are used for sawing building-stone, the disks being driven at a high speed.

Petroleum.

In spite of a bounty of 52½ cents per barrel, the petroleum industry in Ontario has declined from nearly 800,000 barrels in 1907 to less than 290,000 barrels in 1911. There are two refineries in Ontario, but the crude oil is for the most part imported from the United States, the domestic oil being insufficient to keep the refineries going.

Salt.

The salt beds of Ontario extend from the shore of Lake Huron, near the town of Goderich, across the south-western peninsula to the Niagara River. The beds have a thickness from 300 feet in the south-east to 775 feet in the north-west. On the St. Clair River the beds are found at a depth of 1,000 feet and are from 20 to 100 feet thick. The lake or river water is forced down through an outside tube, and the brine comes up through an inner one. The pressure at the bottom of the tube is about 500 lb. per square foot.[1] Operations on a considerable scale began in 1869, but the wells became much more numerous between 1881 and 1890. The annual production of salt in Ontario is about 90,000 tons. About one-half of this quantity is produced by the Canadian Salt Company, whose works are at Windsor and Sandwich. The production of salt has been of enormous benefit to the dairying industry. A demand has also arisen for it for the manufacture of caustic soda and bleaching powder.

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[1] *Summary Rep. Geol. Surv. Can.* 1896, Ottawa, 1896, p. 5, although the mineral is said to have been first noticed by a child. Cf. *Rep. Bur. Min.* (Ontario), vol. vii, Part III, p. 215.

[2] *Rep. Bur. Min.* (Ontario), loc. cit.

THE EASTERN AGRICULTURAL AND INDUSTRIAL REGION

The eastern agricultural and industrial economic region is embraced (so to say) by the region of which an account has been given. The agricultural and industrial area comprises the riparian lands of the St. Lawrence Valley both in Ontario and Quebec and a portion of the Maritime Provinces. Farming and industry are practised on the coast, in the river valleys and sporadically on the uplands throughout regions where fishing, mining, or lumbering is the predominant occupation.

The agricultural areas.

The most important parts of the eastern agricultural region are the rich alluvial soils of the Niagara peninsula and the heavy clay soils of central Ontario. The eastern agricultural region may be broadly divided in an economic sense into two divisions—the self-contained, which comprises the greater part of the province of Quebec, and the commercial-agricultural division, which comprises the agricultural portions of Ontario and of the Maritime Provinces.

The self-contained agricultural area.

The French colonists of the seventeenth century formed their settlements on the banks of the St. Lawrence and its tributaries. The normal dimensions of a grant *en censive* were 4 *arpents* or 768 feet in width by 40 *arpents* or about 1½ miles in depth. Owing to subdivision of the lots, there are now many farms of one *arpent* or one *arpent* and a half wide by 40 *arpents* deep. The villages are thus strung, as it were, along the river banks. On the St. Lawrence they form practically a continuous line between Quebec and Montreal, the parish church being in the centre of each village, and the houses extending on either side of it. On the tributary rivers the villages present the same aspect. Fish traps stand opposite almost every house, and from the beginning of colonization until the present time the *habitant* is as dependent upon the fish which *le bon Dieu* sends into his trap as he is upon the produce of his farm. On the St. Lawrence, especially below the city of Quebec, where fish are plentiful and various, large numbers of eels are caught in the traps by the farmers, who salt them down for winter use or for sale. The surplus products of the farm and of the fish traps are customarily sold, but not until the family requirements are satisfied. The absence of shops in the villages, though not in the small towns, discloses the predominantly self-contained character of village life.

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[1] *Report of the Royal Commission on the Mineral Resources of Ontario*, Toronto, 1890, pp. 45 and 183.

Geographical and allied divisions in the agricultural region.

M. Léon Gérin, in his admirable studies of French Canada prepared after the manner of Frédéric le Play, has pointed out that the characteristic group of settlements is situated in a region which may be divided into three subdivisions in five series from the points of view of geography, topography, agronomy, economics, and sociology. The three geographical subdivisions are—the river bank, the intermediate plain, and the *arrière-plane* or mountain. The topographical division is into three land levels: the flat lowlands, the terrace, and the uplands. The agronomical division is according to the principal characteristics of the soil: the fertile alluvium, the clay of medium fertility, the unfertile sands, and the coarse soils. The economic division is according to production: hay, grains, and timber. The sociological division is into the three orders of inhabitants corresponding to the three distinct physical *milieux* in which they find themselves.

The French-Canadians.

Passing as they did from a region where the undivided family was still the rule, the French emigrants from rural France naturally continued the patriarchal or semi-patriarchal system to which they had been habituated. The property of the family was common property, and every member of the family performed his share of the common labour. The eldest sons always, and the younger sons frequently, lived in the family house together with their parents and with their wives and children if they were married. The extent to which this primitive life has remained undisturbed has depended upon which of the three regions in the above classification the settlers have occupied. In the river region where there is much contact with the moving life of the river, the patriarchal system is disturbed by the activity and variety of the social *milieu*: in the mountain region it is disturbed by the conditions of forest life, and by the difficulty of engaging in sufficiently continuous and profitable labour for all the members of the family within the boundaries of the family property or even within its neighbourhood. It is in the intermediate region that quasi-patriarchalism thrives. The manners of the people correspond to the three sub-regions. In the riparian region the *habitant* has certain pretensions to refinement, and social distinctions make their appearance. From such *habitant* families come the lower ranks of the professional classes—the priests, the physicians, the lawyers, and the politicians of rural Canada. The upland people have rude and simple manners, while the intermediate population possesses at once simplicity and refinement. There are similarly distinct phases of intellectual culture; illiteracy in adolescents is 6½ per cent. in the riparian region, 10 per cent. in the intermediate, and 24 per cent. in the upland region. In the uplands religious faith is intense, and the people are united; in the intermediate region, religion is more formal; it is only on the river that indifference and schism make their appearance. On the river the family property is sometimes large, but the value of it is unstable; the estimated funded property per head is $400, which would make about $2,000 per family. In the intermediate region this amount is estimated at $320 per head; in the uplands at $150 per head. On the river, where the soil is deep and fertile, the cultivation is at once varied and specialized, hay predominating. Crops are grown for the market, for communications are easy. In the intermediate region the clay soil enables the *habitant* to cultivate grain to advantage, and to engage in *petite* culture, and he devotes himself especially in the winter to manufacture for household requirements. The *habitant* of this region is a good carpenter and a good shoemaker, and his wife is a good weaver. The life of the family is thus highly self-contained and stable. In the upland or forest region, cultivation of the land is fragmentary, and the *habitants* engage themselves chiefly in the primitive labours of forest and of forest industries.[1]

Distribution of French population.

The above sketch of French-Canadian life may in general terms be held to apply to the whole period which has elapsed since the English occupation, and with minor differences to the whole of the valleys of the St. Lawrence and its tributaries. In the river cities and towns, notably in Quebec, Montreal, and Three Rivers, settlers of British origin have introduced themselves into the French-Canadian mass;[2] but they are rare in the sub-regions described as intermediate and upland, and even in the river villages, although after 1763 the French villages absorbed many of the disbanded English soldiery. Mutations of the conditions described have been going on slowly. The rapid growth of the village population throughout the nineteenth century has disturbed the

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[1] Cf. Léon Gérin, 'Trois types de l'habitant canadien-français.' in *La Science Sociale*, Paris, 1899, vol. xxviii, pp. 96 *seq.* See also *Proc. and Trans. Royal Society of Canada*, 1898–9.

[2] The following shows the proportions of the population of the province of Quebec as a whole, of French, British, and other origins, from the Census Returns of 1901 and 1911 respectively:

	French.	*British.*	*Other origins.*
1901	80%	18%	2%
1911	80%	16%	4%

quasi-patriarchalism of the three regions in diminishing influence proportionately to their distance from the great ways of communication, but all the regions have been affected by it.

Owing to the increase of the French-Canadian population, the practice of primogeniture, the inferior industrial development of Lower Canada, and the vigorous industrial growth of New England, there occurred for many years a migration of French-Canadians to the United States, where the French-Canadians form a large part of the population of many New England towns. This migration has involved certain reactions upon the life of the villages, and there has, moreover, been in progress a certain interfusion of interests and ideas between the *habitants* of the different regions. The growth of industry, notably at Montreal, Three Rivers, and Sherbrooke, has drawn the French-Canadian women into the cotton and shoe factories, and the men into the bridge works and machine shops. Even in the uplands the manufacture of paper has come to play a large rôle. Yet peasant habits of life are stable, and there remain throughout the province in effect the three subdivisions of which an account has been given, each type of *habitant* occupying a distinct *milieu*, to which his economical and social characteristics correspond.

The agricultural areas of Ontario.

While the agriculture of the province of Quebec is predominantly, although not exclusively, practised by self-contained family and village groups, the agriculture of Ontario is predominantly practised by individual farming families settled upon isolated farms, and is characterized by commercial economy. The Quebec farmer consumes the produce of his farm and purchases little; the Ontario farmer produces for the market, and even purchases many things which he might, if he would, produce for himself. The exploitation of the heavy clay soils of Ontario thus presents a great contrast to the exploitation of the agricultural portion of the province of Quebec. In the latter province we have seen that the agricultural resources have been exploited by a highly homogeneous and stable population, habituated to village life, quasi-patriarchal in its family relations, with a tendency towards the modification of these relations in the riparian villages on the one hand, and in the pioneer farms on the other. In Ontario the alluvial and heavy clay soils have been cultivated by a heterogeneous population, distributed for the most part in isolated farms over a wide area, and characterized by slender social cohesion and the almost total absence of patriarchalism. Diversity of origins and variety of surroundings have produced a much more complex series of types than may be found in Quebec.

Social characteristics in Ontario.

The salient social characteristics of the Ontario population considered as a whole are diversity of race and therefore of character in an ethical and religious sense, a high degree of individualism and of individual mobility, with consequent inferior cohesion of the family and communal groups. The high degree of individual mobility leads to changes of occupation and of residence on slight occasion, and to rapid changes in the standard of comfort. Individualism leads also to variation in spheres other than economic—to dissent and sectarianism in religion and to ethical standards of varying stability.

The society of Ontario, diversified in racial origins as it is, may be regarded as being composed of some of the elements resulting from the decomposition of previously existing European societies, these elements being economically and morally perturbed by the shock of removal to new surroundings in a new continent and being under the necessity of undergoing gradual adaptation to new conditions. While the comparative culture levels of a heterogeneous, individualistic, and fluctuating society cannot be estimated with even approximate accuracy, certain provisional conclusions may be suggested.

Their association with regional divisions.

The general characteristics which have been remarked vary in the three sub-regions into which the agricultural area of the province of Ontario may be divided, in correspondence with the similar regions into which Quebec has been found to be divisible. In the first or riparian region, the agricultural population in the immediate neighbourhood of the urban centres or on the alluvial soils of the shore and bank lands possesses, in general, strongly individualistic characteristics. Habits of association and co-operation are not inherent and are acquired with difficulty. Although market gardening is by no means highly developed, fruit is grown on small farms especially in the Niagara district. Small farmers also supply the pork factories, dairies in the towns, and local markets. From this region the population of the towns is largely recruited. In the second or intermediate region, away from the Great Lakes and from the larger rivers, on the heavy clay soils of central Ontario, the farming people retain a few elements of quasi-patriarchalism, and possess a considerable amount of family and social stability. Their manners are simple, and their habits tend to an almost excessive frugality. Their well-being depends indeed rather upon this circumstance than upon skilful farming. The rural telephone has ameliorated the isolation of the farm, and has contributed to sociability, which was formerly lacking. Although intellectual interest is rare, there is a general belief in the efficacy of education. In this intermediate sub-region, racial character is less diversified than in the other two sub-regions. While the farming population, as also the population of the inland towns in the centre of the farming districts, is predominantly of British origin, there are a few compact settlements of Germans, and settlers from various parts of Great Britain tend to settle in definite racial groups. There are, for example, several Scottish settlements. There is thus throughout this sub-region a certain interior solidarity within the constituent groups of which the population is composed.

The third sub-region comprises the uplands of central Ontario, where the soil is thin and poor, resting upon a rocky substratum, and the probably more fertile but more remote slopes from the height of land in Northern Ontario towards James Bay—the southern extremity of the Hudson Bay waters. Among the isolated farmers in these wide regions there is to be found extraordinary but rarely well directed industry. The farm has been obtained as a rule as a gratuitous grant or alternatively for a very small price: the farmer has little agricultural capital or none; he is far from a market. and he is at the mercy of the seasons. He is thus engaged in an unremitting conflict with Nature, and has neither leisure nor inclination for any but material considerations. Mortgages, unless the money is obtained locally, are rare, because the security is inadequate, and since the farmer rarely possesses agricultural capital of his own, the progress even of an industrious farmer is slow. The most serious disadvantages of such a situation are experienced by the women. In the north, farms are often at a great distance from medical aid, and the women sometimes lack even assistance from others of their own sex. Nevertheless the climate is invigorating, and the farming population becomes less isolated as new farming districts are opened up. Recruits for these are not wanting, although some of them have had no previous experience of pioneer life. The proximity of mining or of railway construction camps in some cases affords a market for farm produce, and if such outlets are not merely temporary, conditions become ameliorated. Some give up the struggle in despair; but seventy years ago pioneers went with equal toil and equal discouragement into parts of Ontario which are now well occupied by a thriving population.

The clay belt of Ontario.

Much controversy has been excited by the opening up to agricultural exploitation of what is known as the clay belt in northern Ontario. This region is traversed by the Grand Trunk Pacific Railway and is tapped by the Ontario Government line to the north from North Bay. The successful exploitation of the region undoubtedly depends upon the prosperity of the mining districts lying to the south of it. Should the productivity of the mines be maintained or increased, the clay belt must become valuable, even although it may not uniformly be susceptible of economical cultivation.[1]

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[1] Cf. *Our Fertile Northland*, Toronto, n. d., and B. E. Fernow, *Report*, Ottawa, 1912.

Farm labour and tenure.

Throughout the three sub-regions above described, a normal Ontario farm of 100 acres is usually cultivated by the owner of the farm and his family without the aid of hired labour. Where a hired labourer is employed, he customarily lives with the farmer's family. In the intermediate or second region and in the riparian or first region, farm mortgages are common. In the third region they are very rare. In this region also there is little mobility of farm property. If a farmer does not succeed, he may abandon his holding unless he can arrange to sell it to an incoming settler. In the second region there is a greater but still not a high degree of mobility; in the first region there is much more, especially in the neighbourhood of growing towns, where encroachment upon the agricultural area invites speculation. In the intermediate or second region it is customary for the farmer wholly to control the family finances. He provides his sons and daughters with food and clothing, but he gives them no money. On the other hand, it is a well-understood practice that the family resources in the hands of the farmer should be devoted to the purchase of a farm for the eldest son, when the family fortune is in a position to purchase and stock the farm, and thus to enable the eldest son to marry. Even after his removal from the family homestead, which customarily takes place upon marriage, the eldest son returns to assist his father during ploughing, seeding, and harvest seasons without payment, at least until the younger members of the family have grown up. This family practice does not seem to cause much friction so far as the eldest son is concerned; but it is not looked upon with favour by the younger members. The absence of money renders them practically immobile; and until their elder brother has succeeded in establishing himself, there is no chance of their owning a farm, even if they should desire to do so. If the family is prosperous, however, one or more members are sent to the university, and are thus drawn into the learned professions: if the family is not prosperous, but the younger members are ambitious, they make their

The farmer's family.

way to the towns and go into business or industry. To the absence of pocket-money and to the severity otherwise of the family discipline is attributed the dislike of the farm which drives the younger members of the farmer's family into the towns. This, however, is not the exclusive cause. The arduousness of agricultural labour—the farmer is really a driving foreman of his sons, as the farmer's wife is a driving forewoman of her daughters—the long winter and the isolation, especially in the remoter districts, are important contributory causes. Conditions vary, however, in different districts; and it is therefore impossible to give a view of farm labour in Ontario which would be uniformly accurate. The conditions described are to be found in their fully developed form in the remoter farms of the intermediate region and in less fully developed form in the neighbourhood of the interior towns; in the shore lands of Lake Ontario they are hardly observable. As in other countries where similar conditions exist, domestic crime is a consequence of severe family discipline. In the riparian and in the intermediate region, where the family is large enough to spare some of its members, the youths go to the north-west to work as harvesters, and return in early autumn when harvest is over. From these regions also there has been a steady drain of the young men to the west. All the prairie provinces have drawn heavily upon Ontario. The rural population of Ontario declined between 1901 and 1911 to the extent of 52,000, or about 5 per cent. of the rural population.[1]

The Eastern industrial region.

The Eastern industrial region occupies a portion of the littoral of the Atlantic coast, a portion of the St. Lawrence valley, and a portion of the coasts of the Great Lakes. The most important industrial activities are necessarily devoted to the exploitation of those raw materials with which the region abounds and to the manufacture of these. In Nova Scotia the presence of

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[1] *Census of Canada, 1911*, Ottawa, 1912, vol. i, p. 528. See also S. A. Cudmore, 'Rural Depopulation in Ontario,' in *Trans. Canadian Institute*, Toronto, 1912.

PLATE XIII. FRUIT ORCHARDS, WINONA, ONTARIO

(Office of the High Commissioner for Canada)

PLATE XIV (*a*). LOGS ON OTTAWA RIVER (ROCKLIFFE, ONTARIO)

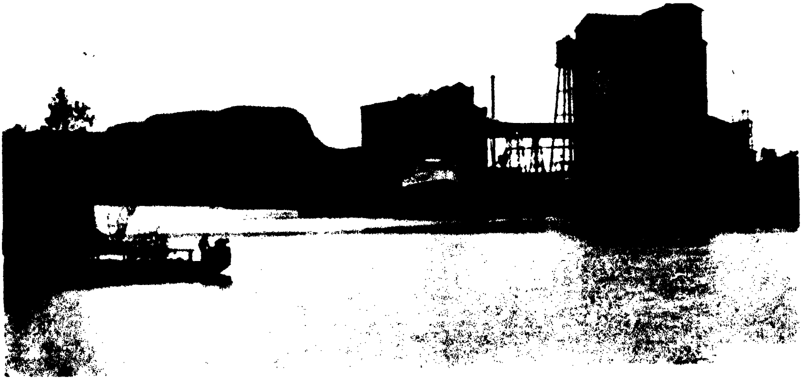

PLATE XIV (*b*). FORT WILLIAM, LAKE SUPERIOR, ONTARIO

(Office of the High Commissioner for Canada)

coal has rendered possible the establishment of steel works, although the absence of a local supply of iron ore is a great disadvantage. In Ontario the absence of coal has been a handicap, compensated to some extent by proximity to the Pennsylvania coal-fields, from which supplies might be drawn, and by the existence of water powers, which by means of electrical conductors might be made available at a distance. The want of coincidence of complementary natural resources in Eastern Canada might appear at first sight to render industrial progress problematical. The enterprise and energy of the people and the provision of means of communication have in a large measure diminished the inconvenience of this lack of variety in resources within the boundaries of the region; and its industrial development has reached a stage which places it beyond question.

Industries associated with forest and agricultural products.

The most important industries of the Eastern region may be regarded as the forest industries, viz. the group of industries concerned with forest products—the preparation of timber for construction purposes; the manufacture of doors and windows, which have been standardized and are now produced by machinery in great quantities; the manufacture of matches, which is a large industry at Hull in the province of Quebec; and the manufacture of wood pulp, principally for paper-making. Pulp and paper are made on a large scale at Grand'Mère in the province of Quebec, at Sault Ste Marie, and at other places. Flour milling is an important industry in Ontario, cement making in the neighbourhood of Ottawa, iron smelting and steel manufacture at Sydney, Cape Breton, and at Hamilton and Midland, Ontario. The finer metals are refined at Sudbury near the mines, and at Thorold in the Niagara peninsula. Industries subsidiary to the directly exploitative industries are chiefly concentrated in the urban centres where labour is more readily obtainable. The manufacture of agricultural machinery is carried on at Toronto and at Brantford, the manufacture of food products from cereals at Peterborough, and the manufacture of bread in practically all the towns, but principally in the larger provincial centres of population.

Other industries.

Distilleries are established at Toronto, Waterloo, and Walkerville; breweries at Toronto and London, Ontario; and aerated water factories at Toronto. Electrical machinery is manufactured at Peterborough and Hamilton, automobiles at Toronto; general machinery is made at Toronto and Hamilton, Ontario, and at Sherbrooke, Quebec. Shipbuilding is carried on at the seaport towns and at Toronto. Throughout the eastern industrial region there are numerous industries which may be regarded under the general heading of chemical industries. Among these the more important are the manufacture of wood alcohol, soap, glycerine, fertilizers, alkalis, refined chemicals, coal-tar, corundum, graphite, asbestos, mica, beet-root sugar, and the exploitation of natural gas and petroleum at Petrolea in Ontario and calcium carbide at Ottawa.[1] Of industries engaged in the manufacture of imported raw materials, sugar refining is carried on in Montreal, tanning (the hides being imported from the Argentine) in the small towns on the edge of the forest region, where hemlock bark is readily obtainable, cotton manufacture in Montreal, carpet manufacture in Toronto, and shoemaking in Montreal. Toronto is the centre of the letter-press printing trade of the Dominion, of paper-box making, and of the jewellery trade. Toronto and Montreal are the centres of the ready-made clothing business.

Economic position of manufacturing industries.

The existence of a relatively large class of manufacturers employing a small amount of capital and a small number of men is noticed elsewhere; here it may be observed that the rise and continuance of the small manufacturers as a class have been due to the relative smallness of the domestic market, to the variety of demand, to the facilities for small credits and to the comparative restriction of large credits owing to the slender accumulation of industrial and commercial capital, and to the competition of numerous and approximately equally skilled and equally active *entrepreneurs*.

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[1] See W. R. Lang, *The Chemical Industries of the Dominion. University of Toronto Studies*, Toronto, 1905.

Economic characteristics of urban centres.

The urban centres of population in the eastern region exhibit the economic and social phenomena which may be expected to arise from the rapidity of their growth from small to relatively large communities. Eagerness for local autonomy and the weakness of the central government of the provinces, together with the entire absence of control over the municipalities by the Dominion Executive and Parliament have combined to prevent progress in municipal government from keeping pace with the economic progress of the country. The more active and superior minds have been drawn into the larger field of Dominion politics or have been engaged exclusively in the pursuit of fortune; and thus the task of municipal administration has fallen into the hands, for the most part, of parochial politicians and of underpaid and frequently incompetent municipal functionaries.

Bearing of economic conditions upon public service.

The results of these conditions, inevitable in a new country in which individualism is the dominant characteristic, appear in defective municipal services, as in Ottawa, Montreal and Toronto, where the deficient water-supply is a source of danger, in the inferior policing especially of the smaller towns, in the prevalent absence of sanitation, as shown, for example, by the reports of the medical officers of public health and of the factory inspectors, and in the insistent demands for the study of 'municipal problems' and for changes in the system of municipal government. The adoption of what is known in the United States as commission government, involving the election of a small number of persons who would be paid salaries somewhat larger than the salaries customarily paid to municipal councillors, and would be required to devote their whole time to the service of the municipality, has been urged in several of the cities. But the insecurity of the tenure of office, the exposure to social and political pressure and the inadequacy of the salaries which the municipalities are willing to pay, seem to militate against the success of the system by preventing properly qualified persons from undertaking the duties of commissioners. The plan, moreover, inevitably compromises the democratic character of civic government, and it is exposed to the objection that it confuses the executive and legislative functions. The difficulty seems insoluble excepting by time. Sooner or later there will arise in Canada, as there is now arising in the United States, a class of disinterested, able and leisured persons who will devote themselves to civic legislative control as a public duty, and will cause the executive offices to be occupied by competent and adequately paid experts who will be required to exercise their functions without regard to local intrigues or to petty political pressure. The extension of municipal enterprises—in the operation of street railways and the like—has undoubtedly contributed to the over-burdening of the municipal councils with work for the performance of which they had no adequate or appropriate administrative machinery, and has thus helped to bring civic administration into discredit, not so much on account of corruption, although that has occasionally been exposed, as on account of incompetence, which has been evident for some years, especially in the more rapidly growing municipalities.

Local protection of industries.

The rivalry of the industrial centres has led to the policy of granting bonuses to factories and of granting them also exemption from taxation for a period of years. This practice has, on the one hand, burdened many of the cities with debt, and, on the other hand, has reduced their revenue. The exemption from municipal taxation of all property held by ecclesiastical and by educational institutions has also imposed a heavy burden upon the cities, and has compelled them to contribute to the maintenance of religion and of education in an indirect and not altogether desirable manner.

Great areas of eastern cities and expense of public services.

The large areas occupied by the eastern cities and the constant encroachment upon surrounding agricultural lands have at once induced excessive speculation in suburban areas and have compelled the cities to furnish means of communication and other municipal services over an area out of proportion to the magnitude of the population. These conditions have not only tended to the increase of municipal indebtedness and to the increase of taxation, but have aggravated the irritation caused by the deficiencies of the municipal administration. Too great density of population is by all means to be avoided; but wide distribution of it, concurrently with demands for urban facilities of all kinds, is enormously expensive. Such demands are frequently made and public movements organized or exploited by owners of vacant property who desire to have its value increased in order that they may be able to sell it to advantage. Since the funds necessary for sufficiently speedy provision of these facilities cannot all be raised by means of taxation without unduly withdrawing from productive industry the means necessary for its support, such funds must be raised by means of loans. The rate of interest for capital is relatively high because of its scarcity in a new country, and therefore the municipalities are driven to borrow abroad. Their demands have thus swollen the aggregate demands for capital which Canada has made upon the money market.

Montreal and Toronto.

Montreal and Toronto are the twin financial centres of the Dominion. They are indeed to a certain extent rivals, since the financial groups of one city are composed of different persons from those of the other, and since the interests of the respective groups are frequently divergent. The greater number of the chartered banks have their head offices in one or other of these cities, and here also are the head offices of the trust, loan, and insurance companies, through which, and by the aid of whose credit, funds are secured in Great Britain and elsewhere for the promotion of enterprises and for farm mortgages. Montreal, being nearer the seaboard and possessing a harbour for ocean-going vessels, has a certain advantage of position over Toronto; but its population is sharply divided into two main racial groups—one, consisting of about two-thirds of the total population, being composed of French-Canadians, and the other, consisting of about one-fourth of the total population, being of British origin. The absence of a common language which results from this racial diversity, as well as social disparity otherwise, has seriously retarded the economic progress of the city, although Montreal has succeeded in retaining the leadership in influence and in finance with which its age has endowed it. The population of Toronto is much more homogeneous, about 86 per cent. being of British origin.

Educational establishments.

Montreal and Toronto may be taken together as the twin educational centres of the Dominion, although there is a larger number of students attending higher educational institutions in Toronto than in Montreal. The University of Toronto is maintained by the province of Ontario, and includes within its somewhat complicated system two federated Universities, and a large number of colleges, including University College, which is maintained by the province. The funds for the maintenance of the University and University College are derived from the share of one-half of the succession duties. The other educational institutions in the province, which are separately maintained by means of public funds, are the Agricultural College at Guelph and the Mining School at Kingston (an appanage of Queen's University there), which are maintained by the province, and the Royal Military College, also at Kingston, which is maintained by the Dominion Government.

Capital and industry in eastern Canada.

The struggle between large and small capitalists, which has become very acute in the United States, and has there long passed into the political field, giving rise to legislative attempts to limit the size of industrial and financial combinations, has not assumed so grave a character in eastern Canada. The reason appears to be that industrial development in the latter region has not proceeded so far as in the former. The method of consolidating industries by means of mergers has been imitated; but the success of the imitations has not been conspicuous, and the small capitalist still holds the field to a considerable extent. This condition has been facilitated by the banks, which have made a practice of lending to the small manufacturers upon the parts of things as they are made. This practice has enabled manufacturers with very slender capital to carry on a relatively large business; although it involves the dependence of such manufacturers upon the banks. It has nevertheless enabled people with technical skill, but practically without capital, to build up manufacturing industries when otherwise such industries could only have been started or maintained by persons having direct control of capital. While there is an undoubted tendency in certain industries towards consolidation, the census returns suggest that the small manufacturer is able to hold his own in certain branches. In the census district of South Toronto, for example, which is the most important manufacturing district in Ontario, one-half of the number of industrial establishments employ 90 per cent. of the total capital and 93 per cent. of the total number of employees, yet the fact that so many small establishments maintain themselves in the face of the competition of the larger establishments is not without significance. It is true, however, that many of these are small workshops in the ready-made clothing trade, and that the conditions of employment in some of them are by no means desirable. According to the census returns of 1911, there were in Montreal 27,948 Jews, and in Toronto 18,237.[1] A very large number of these work in small workshops belonging to Jewish firms. The great frugality of the Jews, and their willingness to work upon a very narrow margin of profit, have enabled them to compete successfully with the large factory-owners and practically to monopolize the trade in certain branches. The Jews in eastern Canada have come chiefly from the Baltic provinces of Russia and from Poland; but many have come from Galicia in Austria and from other countries in eastern Europe. They have acquired a very large amount of property, especially in Toronto, where there are many synagogues and Jewish clubs.

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[1] *Census of Canada, 1911*, vol. ii, p. 372.

Seasonal occupations and unemployment.

The seasonal character of so many occupations and the practice of dispensing with the services of employees, unless these services are absolutely required, render employment precarious. The Canadian is not quite so migratory as the workmen of the United States, yet there is a great amount of migration to and from the Canadian industrial centres. Each winter there is a certain amount of unemployment on account of the seasonal character of many occupations. Farm labourers who are not employed in the winter, excepting where mixed farming or early vegetable and flower culture under glass is carried on, leave the rural districts in the late autumn and with other outdoor labourers seek employment in the industrial centres. When the winter is open, as sometimes happens, they find employment as casual workers in the building trades and in other construction works. Even when the frost comes and outdoor work becomes more difficult, various devices have been adopted to prevent total suspension of operations, unless, owing to depression, the building trades are inert. Some of those who cannot find ordinary employment in the depth of winter are employed by the street cleaning department to clear snow from the streets, although a municipal ordinance, of Toronto for example, which prevents any one from being employed by the city for less than the minimum wage of two dollars per day, somewhat hampers the distribution of relief in this manner. The object of the ordinance, however, is evaded by the employment of men in different gangs on different days, so that the total amount of relief is distributed in such a way as to apply to a relatively large number of men. A heavy snowfall is thus looked upon as a benefit. The pressure of unemployment falls, however, with special severity upon men who are not accustomed to outdoor labour, and when a winter is severe and prolonged the maintenance of these falls heavily upon the charitable organizations.

Rates of wages and cost of living.

The rates of wages in the eastern industrial centres in Canada are somewhat lower than the rates of wages in similar employments in the United States; but employment in Canada is, on the whole, less fluctuating and the cost of living is, on the whole, lower. Agreements regarding the rates of wages are common, and, on the whole, the conditions of these agreements are well kept. The increase in the cost of living which has been observable in Ontario has not been so in the same degree in the Maritime Provinces and in the province of Quebec. It may therefore be inferred that the increase is due partly to general and partly to local causes. The wide general causes need not be discussed here further than to remark that the most important among them are the increase in population, the increase in consuming power, the diversion of capital and labour from agriculture into industry, and the movements of currency and capital. The effects of these general causes upon the eastern industrial region have not been uniform, nor has the development of parallel local causes been uniform throughout the region. In general, it may be said that the influx of population into the larger towns has caused the increase in them of prices of foodstuffs and house accommodation, the supply of neither of which is rapidly responsive to the demand; but that prices of clothing and of miscellaneous commodities, including many foodstuffs, especially those of foreign production, have not advanced. In the smaller towns and in the villages the population has been stagnant or declining,[1] and thus prices have advanced in these places only in respect to those supplies which had to be introduced from the centres where prices had advanced. In the mining regions, the price of supplies advanced because of the increased local demand and the absence of a local supply.

The advance in the price of house accommodation and of factory premises, which arose during the period of industrial expansion in 1900–13, induced a sharp advance in the price of land. These advances were both checked by the rise in the rate of interest first in 1907 and again in 1913.

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[1] Cf. S. A. Cudmore, 'Rural Depopulation in Ontario,' *Trans. Canadian Institute*, Toronto, 1912.

Causes of increase in prices of certain foodstuffs.

The increase of prices of certain foodstuffs was due to various causes. Beef, which had formerly been produced at a low cost upon the open prairie, gradually ceased to be so produced, as the prairie came to be occupied by settlers. The reorganization of the cattle trade could not be accomplished with sufficient rapidity to maintain the supply. There was an inadequate fund of stock, there was inadequate skill in the management of cattle under the changed conditions, and there was inadequate capital in the hands even of those who might have adapted themselves to the change.

The exclusive devotion to wheat in the north-west, together with the heavy drafts of agricultural labour from the eastern region, and the consequent inferior development of the production of miscellaneous foodstuffs, induced advances in the prices of these in the industrial centres.

Difficulty was thus experienced in adjusting the rate of wages and of salaries to the advances in rent and to the prices of certain foodstuffs at a time when the profits as such of industrial enterprise, owing to the increase in the rate of interest, were not advancing because the demands for industrial and other capital were insistent enough to raise the price of it to the organizing employer. The advance of prices of foodstuffs was aggravated by the municipal ordinances, which, passed at the instance of the retail dealers, practically prevented the peddling of vegetables and other farm products, and thus limited local competition. Competition was also limited by the inadequacy of market facilities and by the inferior state of the country roads in the neighbourhood of the towns. These conditions, combined with the depopulation of the rural districts in Ontario,[1] have contributed, along with wider and more general causes, to increase the cost of subsistence.[2]

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[1] S. A. Cudmore, 'Rural Depopulation in Ontario,' *cit.*

[2] On the movement of prices in Canada, see R. H. Coats, *Wholesale Prices in Canada 1890–1909*; *Special Report*, Department of Labour, Ottawa, 1910; *Wholesale Prices, Canada, 1910*, and ibid., *1911*; and *Comparative Prices, Canada and the United States, 1906–11*, ibid., *1911*.

Housing of the working population.

The demand for capital in the north-west fell in the first instance upon the eastern financial centres; the rate of interest was relatively high, owing to the scarcity of capital in proportion to the demand, and thus capital and credit were both deeply engaged in supplying the means for agricultural development. So also the prospect of high gains in mining enterprises absorbed a large part of the available funds in the eastern centres. Protection to industry offered as well the opportunity of high returns to capital. There was thus relatively little inducement for investment in house building, where the returns to capital were in general less than in the forms of investment above mentioned. Under these conditions the supply of houses lagged behind the demand. There were no companies organized for the purpose of supplying workmen's houses, and there was no considerable class of house proprietors building and renting houses for the investment of their capital. The workmen in most of the centres were thus obliged to buy or to build houses for themselves. Up till 1907, the opening up of new districts in the great arc of the circle which surrounds Toronto, for example, enabled workmen to purchase land on easy terms, and lax municipal building regulations permitted them to build small wooden houses at a trifling cost. It was possible at that time to buy a lot of land 25 feet wide and 100 feet deep for about £20, payable in instalments, and to build upon this land a house at a cost of £10 to £20, so that a workman who had saved from £15 to £20 could secure a freehold lot and a house for himself free of rent.

'Shack-towns.'

Large numbers of such houses were erected round the industrial towns. As they were in the rural areas, the taxes were trifling in amount, and the facilities were proportionately slender. There were no streets, no lighting, no water-supply, and no sewerage. Gradually the areas upon which these so-called 'shack-towns' grew up were embraced within the urban districts, streets were made, and other conveniences followed. The land rose in value under the pressure of increasing demand, and in consequence of these improvements, the taxes increased until they became practically equivalent to a rent charge. The mere increase in the amounts involved the workmen who desired to build under the new conditions in financial obligations to which they were unequal, and thus gradually the housing problem emerged as an important fact. The influx of population led to the advance of rents, although even after rents had advanced the greater ease with which higher returns could be secured otherwise, and the memory of a former period of overbuilding, tended to prevent speculation, and serious overcrowding became prevalent in several towns. A small housing company promoted on philanthropic grounds was formed in Toronto in 1913, and was able to embark upon its business under conditions favourable to its pecuniary success.[1]

Hydro-electrical development in the Eastern Region.

The volume of the rivers in eastern Canada, and the abrupt changes in level which occur in their courses, provide abundant means for the development of hydraulic power. The exploitation of the water power of Niagara Falls began on the United States side of the frontier, and extended upon the Canadian side. The power was applied on the American side chiefly to the promotion of industrial enterprise on the spot; in Canada it has been applied chiefly to the promotion of urban transport, urban street and domestic lighting, and power for industrial enterprise at a distance, the electrical power generated at the Falls being transmitted at high tension for distances of rather over one hundred miles. The hydro-electrical works at the Falls have been established exclusively by private enterprises; but a portion of the power generated by one of these on the American side is purchased by a provincial commission in Ontario, which has installed a system of conductors by means of which the power is distributed to various places within the circuit of its operations. The work of this commission is supplemented by the work of civic commissions under which the local supply of power is organized.

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[1] 'Better Housing in Canada: The Ontario Plan,' *First Ann. Rep. of the Toronto Housing Company, Ltd.*, Toronto, 1913.

Similar distribution is also effected by means of conductors installed by private enterprise. In Toronto, for example, a private company possesses a plant at the Falls for the production of power, and a system of conductors from the Falls to Toronto. This company sells the whole of its power to a subsidiary company which distributes electricity for domestic lighting and for power, and to another company by which the street railway of Toronto is operated. The public commission competes in respect to domestic lighting, and in addition undertakes the lighting of the streets, and supplies the power required by an outlying system of civic street railways.

Effective radius of distribution of electrical power.

Electrical power has been utilized, within the practicable radius, by those industries in which the amount of power required is not sufficiently great, or its consumption sufficiently continuous, to justify independent installation of prime movers. The absence of coal in Ontario and Quebec, and the comparative frequency of coal famines, through strikes in the United States or otherwise, have given great importance to the development of electricity as an alternative means of procuring power. Under normal circumstances, for purposes where the form of the motive power is a matter of indifference, and where the amount of power required is large, it appears that there is, at a distance of from ninety to one hundred miles from the source of supply of electricity, a balance of advantage in favour of the steam or the gas engine for direct utilization of mechanical power. Where, however, such prime movers are utilized for the generation of electricity intended for subsequent re-conversion into mechanical energy, the advantage is on the side of electricity produced by hydraulic means at the distance supposed from the point of utilization, but not with certainty at any materially greater distance. The question is thus one of distance, and no doubt improvements in the engineering of the extensive works necessarily required, in the details of the mechanism involved, and in the method of conveyance will increase the distance over which electricity can be transported. At the same time a progressive increase in the price of coal would tend to bring more closely together the comparative costs at greater distances than those supposed.[1]

Water-supply.

It has already been noticed that the chief towns of the Eastern Region are situated on the banks of the St. Lawrence or its tributaries, or on the shores of the lakes which form part of the St. Lawrence system. Mere abundance of water, however, does not constitute a good water-supply. The cities of Detroit, Cleveland, and Buffalo, with numerous smaller cities and towns, pollute the waters of the St. Lawrence before they reach any of the larger Canadian urban centres. Lake Ontario acts as a settling and purifying basin, but its bays are polluted by the sewage of the towns on its shores, and these towns therefore draw their water-supply from polluted sources. There can be no doubt that the practice of pumping water from lake or river below the level of the towns will eventually be abandoned, and that the utilization of natural lakes or constructed reservoirs in higher areas conserved for the purpose will be substituted. Filtration plants, chemical correctives, and sewage treatment systems have not availed to provide a pure water-supply.[2]

CHAPTER VI

ECONOMIC SURVEY (*continued*)

THE CENTRAL AGRICULTURAL REGION

BY PROFESSOR JAMES MAVOR

Relation to the Interior Continental Plateau.

THIS region is nearly conterminous with the Interior Continental Plateau of the geologists. The form of the plateau is a rude triangle whose base is lat. N. 49°, and whose apex is lat. N. 62°, the triangle leaning westwards, and the length of the base being about 800 miles. This triangular plateau consists of three steppes or prairies at different levels, the lowest steppes being in the eastern part of the region. The mean level of the westerly steppe is about 2,000 feet higher than the mean level of the easterly steppe. The rivers have for this reason a rapid course, and not infrequently they flow in deep gorges which they have cut in the soft cretaceous surface of the prairie. The land surface is varied. In the south-east it is characterized by treeless level stretches, large areas of which are covered with water when the spring freshets cause the rivers to overflow their banks. In the south-west the prairie, also unwooded, is broken by frequent ravines and coulées or depressions; in the north there are similar indentations with occasional eminences and park-like timbered lands.

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[1] For details of water powers, see L. G. Denis and A. V. White, *Water Powers of Canada*, Ottawa, 1911, and *Water Powers of Western Canada*, by the same authors, both issued by the Conservation Commission.

[2] For waterworks, see L. G. Denis, *Water Works of Canada*, Ottawa, 1913.

Climatic conditions.

From a meteorological point of view the central agricultural region may be divided into two unequal portions—(*a*) the eastern portion, in which there is normally a rainfall sufficient in quantity and in distribution for the successful cultivation of cereals, and (*b*) the western portion, in which the rainfall is normally less in quantity in comparison with the eastern portion, and is in frequent seasons deficient and unequal in distribution, this portion of the region being therefore less reliable for the cultivation of cereals. The eastern portion of the region comprises the whole of the province of Manitoba and approximately one-half of the province of Saskatchewan. The western portion comprises about one-half of the province of Saskatchewan and the province of Alberta, with the exception of the more northerly parts of both provinces.

The question of the periodicity of rainfall and of the desiccation of the western portion of the plains cannot for a long period be determined with any precision, owing to the short time (only since 1886) during which meteorological observations have been taken. Observations and inductions in respect to analogous regions in Asia and eastern Europe suggest a complicated periodicity involving great cycles of some centuries and inferior cycles of a few years' duration. While the destruction of forests and the cultivation of the soil undoubtedly alter the distribution of moisture on the surface and for some distance beneath the surface of the soil, there is no reason to believe that either of these incidents has any effect upon climate.[1]

The region as a whole: plan of survey for settlement.

The plan of survey in the prairie provinces involved the mapping of the region into square blocks, called townships, each containing 36 square miles. Each square mile is a section, containing 640 acres; and each section contains four homesteads, or quarter sections. Each quarter section is designated by the number of the section to which it belongs, and by the point of the compass, according to its position. A postal address in outlying regions may read: NW. quarter of Section 16, Township 40, Range 10, West of 2nd Meridian. The sections on the plan are numbered from the SE. corner of the township to the SW. corner, Nos. 1–6; Nos. 7–12 are to the north of the first row, No. 7 being north of No. 6, No. 18 is north of No. 7, No. 19 north of No. 18, No. 30 north of No. 19, and No. 31 north of No. 30. Throughout the region Sections 8 and 26 in each township form the land grant of the Hudson's Bay Company, and Sections 11 and 29 'are set apart as an endowment for purposes of education'.[2] In those areas which were under grant for purposes of selection to railway companies, each alternate section is granted to such companies and is held by them for sale, while the corresponding section is held by the government for free grants to individual settlers. The railway companies have customarily raised money upon the security of their grants by means of land-grant bonds, and the local school trustees have similarly raised money by means of bonds upon the security of the school lands; both kinds of bonds have been in course of redemption as funds respectively accrued from the sale of lands.

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[1] Cf. *Report to the Board of Trade on the North-West of Canada, with special reference to Wheat Production for Export*, by James Mavor, Parliamentary Paper, C. 2628, London, 1904, and *Agricultural Development in the North-West of Canada*, 1905–9, supplementary to the foregoing, printed *in extenso* in *Report* of the British Association, Winnipeg meeting, 1909, London, 1910, pp. 209 *seq.*

[2] *Revised Statutes* (Dominion), chap. 54.

Grant of land sections to railway companies.

The method of granting alternate sections of land to the railway companies for the purpose of enabling them to borrow the funds necessary for the construction of the lines was adopted for three reasons. Firstly, if the grants had been in solid blocks such a plan would have endowed the railway companies with practically complete territorial control over the regions so granted; and the plan of leaving in the hands of the government an amount of land equal, or nearly equal, to that granted to the railways within the area of the land grants prevented such a condition from arising. Secondly, in the event of the value of the lands being increased by the settlement induced by the railway companies, who would naturally desire to sell their lands and so relieve themselves of interest charges upon their loans or land bonds, the government would gain either through increased inducement to homestead settlement or through the sales of land at higher prices than might otherwise be obtained. Thirdly, the railway lines would inevitably pass through the railway land grants, so that unless the government undertook the construction of lines through the separate areas remaining in its hands, settlement would be forced into the railway regions and would be retarded in the government regions.

Results of alternate settlement.

The method of alternate settlement, however, had grave disadvantages. It produced a very uneven distribution of the population over an extremely wide area; and it resulted in isolated settlement. Isolated settlement involved undue cost of local administration as well as other ulterior social and economic consequences. Education of widely separated families is at once difficult and costly; and, therefore, the strict application of a compulsory system of primary instruction has been practically impossible. The organization of markets has been rendered unduly difficult, and thus isolated settlement has prevented the cultivation of miscellaneous crops, and has driven the farming population to specialist production of wheat. The weariness induced by isolation has driven an undue proportion of the population into urban centres, and has also resulted in an increase of mental disease, especially among women. The same condition has rendered the organization of medical attendance a matter of grave difficulty and great cost.

Block grant to C.P.R.

One instance only has occurred in which the land grant of a railway company has been converted from an alternate-section-grant into a block-grant. This is the grant of 3,000,000 acres of land in one block to the Canadian Pacific Railway Company, being the balance of their original grant of 25,000,000 acres. This area has been dealt with in this manner in order to enable the company to embark in an extensive scheme of irrigation. The area in question was not regarded as otherwise susceptible of economical exploitation. The company has already constructed an irrigation system and has been selling the land to settlers at a price which includes the cost of the water for irrigating purposes. This plan appears to have worked out successfully.

Homestead settlement.

The method of settlement adopted by the Canadian Government in the north-west was copied from the method in use in the western states of the United States. This method involves a free grant of land (subject only to a registration fee of $10) to any able-bodied man who is a citizen of Canada or is British born, or who is intending to take out naturalization papers. The grant is given on the conditions that the settler resides upon the grant and that he cultivates a specified proportion of it. The settler does not receive the patent for his land until he has fulfilled the required conditions. A provision exists in the homestead law, which has occasionally been taken advantage of, whereby settlers may group their houses together in a hamlet and may cultivate the surrounding area without dwelling upon their separate lots. The area of a free grant is 160 acres, or one-fourth of a square mile. If a farmer has grown-up sons, each of them may enter for a homestead, and if they choose and if the group of homesteads are contiguous, they may reside at the paternal homestead. It is customary for a farmer who takes a homestead to purchase on instalment terms another quarter-section of 160 acres from a railway company, or from the Hudson's Bay Company or from school land areas. The government does not customarily sell lands within the areas set apart for homestead settlement. A homestead entry may be made for less than 160 acres, but such entries are very unusual.

Undoubtedly a generous land policy is, on the whole, most advantageous for the government and for the settlers alike. It induces settlement, and draws taxpayers into the country. It offers to the settler the prospect of an increase in the value of land, as the farms in his neighbourhood are taken up and as the area of desirable land available for free settlement diminishes. The eventual distribution of the land in the fertile areas may be such that the normal area of a farm will be less than 160 acres. On the other hand, there is the risk that after the good homestead land has all been taken up, prices to new-comers will rise to such a degree that they will find themselves in the pinch of land scarcity, while, side by side with them, there are old settlers who have acquired their land for nothing and are in possession of a relatively large block of it. This distinction between 'old-livers' and 'new-comers' emerges in all communities in which such land systems obtain.

Need for a scientific agriculture survey.

The land of the Prairie Provinces has not yet been fully surveyed in any sense. The Dominion Land Survey, which is carried out under the administration of the Department of the Interior, has been at work for many years, but its task is by no means completed. This survey, reliable as it is within the limits of its intention, undertakes to survey only lands which are to be opened for settlement. After settlement takes place, excepting in cases of dispute about boundaries, the Dominion Survey is not concerned. The homestead inspectors are entrusted with the duty of seeing that homesteaders fulfil their obligations; but they are not required to record the character of the cultivation, the area cultivated, or the quantity of the crop, unless the conditions of homesteading are not being fulfilled. The Dominion Census Department procures, through agents appointed by it, information about the areas under cultivation and the crops in the various districts; and the provincial departments of agriculture have also their correspondents and their independent sources of information. The railway companies collect some data, and so also do the banks. The result of these various inquiries, conducted on various systems, or without system, is an annual series of estimates of a discordant character. None of the authorities mentioned trusts the others. The results of the inquiries made on behalf of the banks and of the railway companies are not published in detail, but probably, as a rule, they are more reliable than the others because administrative action of an important character must depend upon the soundness of the estimates. The results of the inquiries on behalf of the government—Dominion and provincial—are not necessarily acted upon by anyone. They are not generally accepted as indisputable.

Although an agricultural survey conducted at intervals of (say) five years, accompanied by a careful agricultural census each year, would be a costly affair, the advantage of it could not be questioned. It would involve the employment of a large number of competent agronomists to whom the task of obtaining and compiling the necessary data would be entrusted. Hitherto the collection of agricultural statistics has been wholly in the hands of amateurs, and the work has been unnecessarily duplicated by different agencies, all of them more or less unequal to the task.

Speculative forecasts of wheat production.

While loose prophecies of future wheat production are prevalent in Canada, and while they serve the temporary purposes of the politician and the land speculator, they are destitute of scientific or of practical commercial importance. Unfortunately, the statistical data which are available do not command sufficient confidence to justify conclusions as to how far the actual production corresponds with the estimated possible productivity of the land. Although no agricultural survey has been made, the whole of the settled area and a considerable portion of the area suitable for settlement have been surveyed under the Dominion Land Survey branch. The surveys made for purposes of land measurement are to a certain extent surveys of the nature of the land from the point of view of its susceptibility to cultivation. Much of the area in question has been surveyed by the railway companies with a view to the selection of their land grants; while a large part of the region has been examined with care by competent experts employed by the various loan companies. The interests of these companies lay, of course, in placing a conservative estimate upon possible productivity; but the information collected by them, so far as available, was of great value.

Estimates of area available for wheat growing, and yield.

In 1904 the writer invited several highly competent experts, who were thoroughly familiar with the conditions of the prairie region and were in a position to avail themselves of the sources of accurate knowledge indicated above, to form estimates of the possible area of wheat production and the possible yield of wheat from that area. These estimates were to be based upon the fullest and most detailed data of a scientific character then available and upon the assumptions that the yield per acre of the land then in cultivation would not diminish, that a population sufficient to secure the production in question would in time settle in the country with adequate agricultural capital and skill, and that all of the area suitable for the cultivation of wheat would be utilized for that cultivation, the necessity of periodical fallowing being taken into account. Two estimates based upon data of the necessary precision were forthcoming. These were formed by three gentlemen who had all been professionally engaged in surveying for one or other of the purposes above indicated; they were in possession of the necessary material, and they were all exceptionally well qualified for the task which they generously undertook.

The higher of the two estimates in question placed a limit of 22,432,000 acres as the extreme acreage which could be expected to be devoted annually to wheat cultivation in the prairie region now comprising the provinces of Manitoba, Saskatchewan, and Alberta.

The total yield from the area in question was estimated at 357,445,000 bushels per annum; but the period at which this maximum yield might be expected to be produced was not estimated. The joint authors of the lower of the two estimates, particulars of which need not be given here, calculated the average annual yield at 18·5 bushels per acre, while the author of the higher estimate, particulars of which have been given above, placed this figure at 15·9 bushels per acre.

Other contemporary estimates offered a much higher maximum yield, and one of them stated that in the year 1912 the yield would reach 350,000,000 bushels. The experience of the years since 1904 has altogether falsified the predictions of the latter forecasts, and has strongly confirmed the more cautious estimates published in the Report to the Board of Trade furnished by the writer in 1904.

The crop statistics of the Dominion and of the respective provinces, which are not at all in accord, leave much to be desired in point of accuracy and consistency; but no other statistics are available, and the Dominion statistics are probably the more reliable. Between 1901 and 1911, the population increased by 315 per cent., while production of wheat increased by 307 per cent., approximately in the same proportion. The production, however, has been subject to serious fluctuations. The close approximation of the average yield for fifteen years, 1898–1912, namely, 18·69 bushels per acre, to the higher of the two estimates of yield quoted above, 18·5 bushels per acre, is noteworthy. The yields, however, fluctuate greatly, ranging from 9·11 bushels per acre in 1900 to 25·16 bushels in 1901, a figure which has never since been reached.

Eastern portion of the Central Agricultural Region

Soil and agriculture.

The soil of the Red River Valley is in general a rich black loam somewhat similar to the Black Soil zone of South Central Russia. The richest portion of the district is the floor of the ancient Lake Agassiz, which lies south of Lake Winnipeg and extends west of the Red River Valley for about a hundred miles. Manitoba has been settled largely, although not exclusively, by farmers from Ontario, who were, to begin with, wholly unaccustomed to prairie farming, and were very slenderly supplied with agricultural capital. The richness of the soil and the ease with which it may be cultivated, however, has enabled the Manitoba farmers, as a rule, to secure large profits from the cultivation of wheat. Unfortunately, these large profits have been employed to a considerable extent in the purchase of areas of land wholly beyond the productive powers of the farmer. The economic effects of excessive purchases of land have been the rapid advance in its price, the ineffective cultivation of large portions owing to the absence of sufficient agricultural capital and to the difficulty of obtaining labour, a scarcity of land in the most fertile regions, and diminished yield per acre owing to the progressive exhaustion of the soil through improvident farming. The quality of the grain has also exhibited a tendency to deteriorate owing to the prevalence of foreign grains in the samples, due to ineffective measures to prevent the growth of weeds and to indifference in the selection of seed. Notwithstanding these drawbacks, farming profits have been high in normal years, and thus, in the absence of an elevated standard of comfort, there has been little inducement towards the improvement of agriculture. This condition has been aggravated by two causes—the low standard of education throughout the province of Manitoba, an inevitable consequence of rapid and isolated settlement,[1] and the

[1] The principal causes of the inadequacy of education in Manitoba are shown by the Reports of the Education Department of that province to be the wide distribution of the population under the system of isolated

occupation of some of the richest lands by stagnant communities like the Mennonites, who practise a largely self-contained life and whose simple habits render them indifferent to agricultural progress.

The population of Manitoba.

From a socio-economic point of view, Manitoba society may be divided into three strata: (1) the stagnant communities of which mention has been made, the Mennonites, the French-Canadians who occupy a portion of the Red River Valley, and some other foreign groups; (2) the pushing commercial farmers, chiefly of Scotch-Ontario extraction; and (3) the urban population of Winnipeg, Brandon, and other urban centres.

(1) *The stagnant groups.* These groups are very industrious, very orderly, and very prosperous within the narrow limits of their intentions. Many of them are ignorant of the English language. The Mennonites, for instance, speak a corrupt German, and the French-Canadian the patois of Quebec. Their manners are simple, and their powers alike of production and consumption comparatively small. They are, as a rule, indifferent to education, and some of them, the Mennonites again for instance, take no part in the political or social life of the province. They are scarcely at all affected by fluctuations in the prices of produce or in the price of land. When prices are high they are not so well off, and when prices are low not so much depressed as their more active neighbours.

(2) *The pushing commercial farming groups.* These constitute, from the point of view of commercial progress, the back-bone of the country. They are shrewd bargainers, although they are rarely skilful farmers. Their manners

settlement, the difficulty of procuring competent teachers (owing to the superior attraction of occupations other than teaching and to the higher salaries paid to teachers in Saskatchewan and Alberta), the short period during which teachers will consent to continue their services (especially females, who customarily marry within three years after entering the profession), the numerous languages spoken in the isolated farm-houses (German, French, Polish, Ruthenian, Swedish, Icelandic, &c.), and, above all, to the indifference of the people to the advantages of education. Cf. *Reports of the Department of Education* (Manitoba) for 1910 and 1911, Winnipeg, 1911 and 1913, e.g. pp. 46 and 134 (1910) and 55 and 165 (1911).

are simple, and their standard of comfort is customarily so far below the level of their means that they save in order to accumulate land. The scarcity of labour has driven them into the use of machinery, while their want of knowledge of mechanics and the difficulty of procuring building timber have contributed to neglect and consequent deterioration of the agricultural implements they possess. The diversion of their savings into purchases of land and machinery, and their exclusive devotion to wheat, due partly to the scarcity of labour, and partly to the absence of facilities for marketing other crops, have prevented them from improving their cattle by the introduction of good stock. They are thus not in a position to practise mixed farming to advantage. For the rest, the Scotch-Ontario farmer in Manitoba is a keen and not over-scrupulous politician. He sends his representatives into the legislature and into the provincial Cabinet with the very definite intention that what he conceives to be his interests will be fully safeguarded and promoted.

Causes of the growth of towns.

(3) *The urban groups.* The rapid growth of the towns and the large proportion which the urban population bears to the total population have been due to a series of interacting causes. Railway construction drew large numbers into the country, many of the immigrants crossing from the United States, where they had been employed as navvies. During the winters, when out-of-door work was difficult or impossible, many of the men employed on railway construction went into the towns. As this construction was completed in the several localities the disbanded railway workers, excepting when they took up homesteads, either left the country altogether, or sought employment in the urban centres. They were obliged to adopt one or other course, because specialist wheat-farming does not offer constant employment to hired labourers. Some of them took up homesteads; but many of them were reluctant to do so, because they were more accustomed to the migratory habits of railway-construction gangs than to the settled condition of home-

steaders. Railway construction also drew into the country a large amount of capital, a great portion of which was necessarily expended locally in wages and supplies. The small trader followed the construction camps as the land speculator preceded them. Together they established trading centres, and as immigration flowed in the farmers brought demand and supply alike to those centres. The railway gangs and the specialist farmers are good customers of the local merchants, because the first do not, as a rule, produce anything for immediate consumption, and the second produce predominantly for the market. Indeed, in a specialist wheat-farming district, the local storekeepers must import even foodstuffs from eastern Canada, because of the impossibility of obtaining from the local farmers the supplies necessary to meet the demand. The urban centres thus experienced a growth which in a sense is abnormal, because it results from the concurrence of two conditions, one temporary and the other probably not permanent—the construction of railways and the high specialization of farming.

Land purchase in urban areas.

Under these conditions, in the urban centres and in their neighbourhood there has been great mobility of property in land. Prospects of rapid advance in price from nothing (the value of a free grant) to a considerable amount per acre in the outskirts, or per lot or per foot in the urban areas proper, induce frequent sales of the same piece. The practices of lending money on mortgage for short periods and of purchasing options on land contributed to this mobility. The violent optimism of the communities in which real expansion, as well as speculative expansion, was going on, attracted immigrants who were eager to share in the active interchange of property. This high mobility of property brought into the towns banks, loan companies, lawyers, real estate dealers, shopkeepers, and others engaged in more or less parasitic occupations. The urban communities thus tended to grow to a greater extent than the surrounding farming districts seemed to justify. Yet the relatively high profits of farming and the increasing wants of the more progressive among the farming population, together with the frequent visits and occasionally prolonged residence in the winter of farming families in the towns, contributed to the stimulation of their growth.

These conditions, however, were not uniform throughout the region. The towns grew, as might be anticipated, chiefly in the wheat areas, because there little besides wheat was produced. These areas have been settled chiefly by settlers from Ontario and from the United States. There are also in Manitoba extensive settlements of Scotch farmers who adopt the same methods of agriculture. In the foreign settlements, those of the Mennonites and Galicians for example, the communities are more self-contained. They produce most of their own food and sell only the surplus; and their household economy being more frugal than that of the others, they buy less. They are indifferent about appearances, spend little upon non-essentials, and contribute little to the support of the towns.

Municipalities and taxation.

The rivalry of the growing towns and the anxiety of the land speculators to develop the areas which they had undertaken to exploit led to enormous expenditures for paving and other municipal services. Although the towns occupied relatively large areas, the portions actually occupied by business premises were comparatively restricted, and for this reason urban communications became important. Sometimes street railways were provided by joint-stock companies working with extra-provincial or foreign capital, and sometimes street railways, electric lighting, and other services were undertaken by the municipalities. The result of these various conditions has been the growth of a very large aggregate of municipal indebtedness. Although the solvency of most of the municipalities cannot be called in question, it is obvious that uninterrupted growth is necessary to enable them to prevent the local taxes from becoming abnormally high.

The municipal tax-system of the West has been modelled in general upon the complicated system of

Ontario; but, owing to the slenderness of industrial development, taxation has principally devolved upon land. With a view to the encouragement of building, the assessments of taxes upon land have in general been greater than those upon buildings. This practice has been adopted in deference to public opinion. The reason for it is the expectation that land will be forced upon the market, and that it will not be held for speculative purposes. There is, however, no evidence as yet that any material change in the speculative land market has taken place in consequence of this practice. It is clear that, unless the tax-rate is abnormally high, the rate of interest upon loans must be a more important factor than the tax-rate in determining the period during which land may be held by speculators. There is some reason to believe, however, that the method of assessment above described is tending to concentrate buildings upon relatively small areas, to increase the height of the buildings, and to promote congestion in the centres of the towns, even though their geographical position on wide prairie levels would suggest the possibility of their expansion in all directions. Public opinion on taxation fluctuates so much that it is impossible to predict the next step which may be taken by the western municipalities, in endeavouring to meet the obligations which they have undertaken in a period of rapid growth.

Character of the urban groups.

The character of the urban communities may in some measure be surmised from the above description of their constituent elements. Mere rivalry has led to a kind of civic pride; but the population of the towns fluctuates greatly. The absence of stable employment, the seasonal character of most of the occupations, and the high degree of mobility of land render this condition inevitable. The mass of the population of many of the larger towns is migratory by habit; and even the professional people change their place of residence with some frequency. A speculator in land who has realized his holding in one place moves to another to repeat the process of purchase and sale, carrying to the new field his experience of methods of placing land on the market to the best advantage; or he retires to the East, where the climate is more to his liking.

In the towns complete illiteracy is rare; but the educational standard is probably somewhat lower than that of provincial towns in Great Britain or on the continent of Europe. Foreign immigrants for some time after their arrival customarily receive the newspapers of their native places, and in this way retain some contact with external affairs; but the Ontario settler, even in the towns, carries his parochialism with him, and he is customarily ignorant of, as he is indifferent to, the events or the politics of any but his own locality. In the latter, however, he is thoroughly expert. The settler from the United States—whether he is a native American or a returned Canadian—is of similar type, although, as a rule, he possesses more capital, and is to an even greater extent infected with land hunger. He often purchases land to such an extent as to compromise the cultivation of it by leaving too small a margin of agricultural capital if he is a farmer, or too small a commercial capital if he engages in business in the town.

The population of Saskatchewan.

The constituent elements of Saskatchewan society are approximately the same as those of the society of Manitoba. There is, however, a larger proportion of non-British and non-Canadian elements, and there is a larger number of self-contained or semi-self-contained groups.

The Dukhobors and other communities.

(1) The category of stagnant or self-contained groups includes the Dukhobors, a Russian dissenting sect, a large number of whose members emigrated from the Caucasus in 1899.[1] Upwards of three-fourths of this group practise a closely self-contained communism. They purchase little from the outside, and practically nothing from the neighbouring towns. Their purchases, such as they are—tea,

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[1] On the Dukhobors see Mavor, *Report*, cited above, p. 15. Unfortunately, there is no reliable recent critical study of the workings of the Dukhobor system. The only book upon their economic life of real value is *To America with the Dukhobors*, by Leopold Sulerjitsky (in Russian), Moscow, 1905.

sugar, leather, cotton and woollen cloth, iron bars, salt, and a few other commodities—are nearly all raw materials which are utilized by domestic industry. The Dukhobors do not therefore take a place as members of a commercial community, and their very virtues have made them obnoxious to their neighbours. They have also, however, rendered themselves generally unpopular by their refusal to submit to the vaccination law and to other laws passed in the interests of public health, by refusal to register their births, marriages, and deaths, and by frequent, although not invariable, refusal to send their children to school. They seem to think that it is possible to form a state within the state, suspended without organic connexion, owing its existence to the state and yet rendering nothing in return. There are smaller and less stagnant groups of Mennonites in Saskatchewan, hived off from the parent stock in Manitoba, but in general less infected than the parent stock with extreme conservatism.

Valuable and stable elements in the population as these groups may eventually become, they may take at least a generation to adapt themselves to their new social surroundings, and in doing so they may lose a large part of their traditional culture without acquiring any other worthy culture to take its place. But it is probably more in the interests of civilization that the whole community should advance together than that the social elements should remain disparate through diversity of economical ideals. In other words, it is not clear that civilization is advanced by a hard social knot, whose economical system differs radically from that of the surrounding society, but whose virtues, such as they are, are not communicable, because there is no common ground of organic economical relations.

The experience of the communist and semi-communist groups in the Canadian North-West has not demonstrated that either a greater material or a greater intellectual output may be expected from such systems than from the individualist system of current society. It may be that the spiritual output is greater, but that is not measurable in an economic balance.[1]

Commercial farming class.

(2) The commercial farming class in Saskatchewan consists of Scotch and Scotch-Ontario farmers, of returned Canadians from the United States, and of some portion of the foreign groups. The latter, although predisposed to diversified farming and a self-contained polity, quickly imitate the farmers around them. The whole of the groups practising commercial farming may be said to be devoting themselves to the production of wheat for sale. They are thus under the necessity of purchasing what they consume and of buying all the implements and materials they use. For the service of this class the towns have grown up. Through the towns there pass on the one hand the products of the commercial farmer, and on the other nearly all the commodities he consumes. For the commercial farmer, also, all of the branch and two of the main lines of railway have been constructed. He forms the bulk of the community, and his influence upon the course of provincial legislation is paramount. The legislature of Saskatchewan is completely dominated by him, and he exercises no inconsiderable influence at Ottawa. As a rule, the farmer holds much more land than he can possibly cultivate, and generally more than he has paid for. A large proportion of the farm lands of Saskatchewan is mortgaged.

Indebtedness of the farming community in Saskatchewan.

In the nature of the case, the farmer everywhere must possess or obtain capital sufficient to provide the necessary stock and implements for the conduct of his business, together with the means of paying for the labour of cultivation and for the seed as well as for the subsistence of his household until a crop is obtained. In a country where the farm lands are customarily the subject of free grants, there is no interest charge on account of the capital which would be invested in the land if it were purchased; but the homestead farmer is not as a rule satisfied with his 160 acres of free grant; he usually purchases 160 acres or more in addition. The payment for this additional land is customarily made in instalments, interest being charged upon unpaid amounts. If 160 acres is the area which it is reasonable to expect one family to be able to cultivate, it is clear that on the average a farmer purchases another similar area, whether he can cultivate it or not, because the mean area per farm in Saskatchewan is almost 300 acres. The habit of land hunger has undoubtedly contributed to the indebtedness of the Saskatchewan farmer, and his speculations in land have involved him in heavy interest payments. His optimistic attempts to cultivate a large area have led him to purchase agricultural machinery on credit to an extent greater than his prospective income justified, and the fluctuations of the wheat market upon which he entirely depended have on occasion embarrassed him more or less seriously.

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[1] Some of the economic aspects of the compact colony are discussed in *Report*, above cited, and in the evidence given by the writer in 1905 before the Departmental Committee on Agricultural Settlement. See *Report* C. 2978–9, London, 1906.

The *Report of the Agricultural Credit Commission of the Province of Saskatchewan*, 1913,[1] discloses a very large amount of indebtedness on the part of the farmers of the province. According to this Report, four-fifths of the farms in the province are mortgaged.[2] The total amount of the mortgages is stated by the Report as not less than $65,000,000. In addition to this amount the Report estimates the amount due for agricultural machinery between $35,000,000 and $40,000,000; and the amount due on miscellaneous account, unpaid instalments on land, debts to shopkeepers and the like at $50,000,000. The total of these amounts is at least $150,000,000, or more than £30,000,000. For the 96,000 farms of Saskatchewan this represents a debt of about $1,500 per farm, or $12·70 (£2 12*s.* 3*d.*) per acre of improved land.[3] This is a startling total when it is realized that the mortgages, which amount to rather less than one-half of the total, are preceded under the Saskatchewan statutes by no fewer than fourteen prior liens, among which are seed loans made by the government, wages to labourers, &c. That under these conditions the rate of interest is high need not cause surprise. Moreover, since a large number of the loans for all purposes are made in small sums, the disadvantage which always attaches to retail purchasing causes the rate for small loans to appear unduly high. The commission reported that no loan to a farmer was met with at a higher rate than 12 per cent., when the sum was in excess of $100; but for small sums the minimum rate of $1 made the rate of interest appear to be 18¾ per cent.[1] The normal rate of interest in the north-west is 7 per cent. or 8 per cent.

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[1] Regina, 1913.

[2] *Rep. Ag. Com. Sask.*, 1913, p. 47.

[3] Area of improved land (1911), 11,871,907 acres. *Bulletin IX*, Fifth Census of Canada, September 3, 1913, p. 6.

Relation between indebtedness and rapid development of the land.

It should be made plain, however, that this enormous borrowing has been due to the rapidity with which the country has been settled, and that it is reflected in the increase of cultivated land and of production. Between the census years 1901 and 1911 the population increased by 5½ times, the number of farms by 7½ times, the occupied land area by nearly 8 times, the improved land by 10 times, and the production of wheat by about 15 times.[2] This extraordinary growth could not have taken place without a stream of capital, and the stream of capital would have had no existence unless there had been the attraction of high rates of interest to direct it towards this particular region.

In order to assist the farmer to bear and to discharge his heavy financial burden, the provincial government proposes to guarantee the bonds of a Society for Co-operative Credit. If such a society, the administration of which must be local and partly voluntary, succeeds in borrowing abroad, it may be able to contribute to the reduction of the rate of interest now paid by the farmer, and thus to the amortization of his loans without increasing his burden. If, however, the funds raised by means of this society are employed for further speculation in land or for further purchases of machinery, the farmers' position must deteriorate rather than improve. The experience of co-operative loan societies in Europe has shown that the extent of borrowing increases with the diminution of the rate of interest.

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[1] *Rep. Ag. Com. Sask.*, 1913, p. 55.

[2] Calculated from data in Census Bulletin cited above.

The urban areas of Saskatchewan.

(3) The towns of Saskatchewan have grown out of proportion to the growth of the population around them. The chief reason for this urban growth has been the specialist production of wheat, which has caused the farmer to be a wheat-producer and a consumer of other things which he does not produce. He is thus, as regards consumption, almost in the position of a town artizan, whose wants must be supplied by others because he is engaged in producing, in order to supply the wants of distant persons. The production of a single crop, and that mainly for export, involves the importation of the commodities which enter into the consumption of the farmer. Since every farmer in the wheat districts is pursuing the same agricultural policy, most of the wheat must be exchanged for other commodities, and the towns live upon this practice. Increase in specialized production must benefit the merchant, the railway, and the capitalist who furnishes commercial credit; diminution of specialized production and an increase in mixed or miscellaneous farming would render the farmer's life eventually more secure, but would change in a large measure the mode of his life and the character of his wants, and would therefore react upon the towns and, at least temporarily, upon the traffic of the railways.

While Manitoban society has the advantage of relative antiquity and therefore of greater stability and immunity from the consequences of minor economic fluctuations than the society of Saskatchewan, the latter has the advantage of more recent experience of European traditions and of certain elements of European culture. Although traditions and culture are alike those of the eastern European peasant, the shock of removal to wholly new surroundings has not entirely obliterated them. Yet the temporary absence of a common language has prevented these elements from influencing in any appreciable degree the elements surrounding them. The numerousness of the races and the freshness of a new life with enlarged material possibilities have given a certain openmindedness, an anxiety to learn and a desire to become acquainted with the experience of other countries, all of which are quite foreign to the self-sufficient farmer of Ontario or of Manitoba. The legislature, guided by the small group of party politicians who have assumed the leadership, is exposed because of this trait to rash experiments in legislation. It is not always obvious that to tax an immovable commodity heavily is to diminish its price and to tax a movable thing heavily is to increase its price. Hence while the legislator is reluctant to tax land, excepting urban land, he is not always equally reluctant to tax capital. The taxation of urban land, if pushed far, must diminish its net price, and the taxation of capital, if also pushed far, may arrest the stream of it into the country.

Wheat-growing in Saskatchewan.

The economical conditions of Saskatchewan which have resulted in enormous agricultural indebtedness are attributed by the Report of the Commission above mentioned to a number of causes, among which is placed 'too exclusive devotion to grain-growing'.[1] In order to counteract this tendency, a propaganda for the adoption of mixed farming has been conducted for some years. It must be observed on the one hand that complete alteration of the economic structure of a whole community presents a very hard task, and on the other that it was upon Saskatchewan that the optimistic anticipations of those who predicted the exportation of wheat to the extent of a thousand million of bushels leaned for the verification of their prophecies. If the Saskatchewan farmers listen to the advice of their own Commission, they may contract the growth of wheat and increase the growth of other crops and of cattle. If they do so, the expansion of the Canadian wheat crop to the dimensions predicted by enthusiastic advocates of wheat-growing may not be realized. It is nevertheless probable that wheat will continue to be the principal crop in Saskatchewan, for the reason that it is on the whole probably the most economically advantageous for that region, and that wheat-growing may considerably increase in that province, while it remains at comparatively small dimensions in the two other prairie provinces.

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[1] *Report*, cited, p. 203.

Western Portion of the Central Agricultural Region

The semi-arid region.

The western portion of Saskatchewan and the whole of Southern Alberta lie within the so-called semi-arid region. This region forms the northern portion of the great triangular desiccated area which has its base in Mexico, and encloses a large part of the United States between the Rocky Mountains and the Mississippi Valley. The Canadian portion of the area is less arid than the more southerly portion. The available knowledge on the subject is derived from observations extending over too short a period of years for a decisive answer to the question whether the area is becoming, however slowly, more dry or more moist. Analogous regions in Asia, of the history of which more is known, appear to exhibit a double periodicity of oscillations between drought and moisture, involving a long period of not less than three centuries and a short period of some thirty years.

It would be important to know at what point even in these long periods a particular moment might happen to be. It might be possible to prepare years beforehand for excessive drought, or to enjoy the satisfaction that each year would normally bring a little more moisture. From 1892 till 1895 the rainfall was deficient; but from 1896 onwards the rainfall has been adequate for the growth of crops, although not uniformly ample.

Mr. J. S. Dennis, who was for many years in charge of the Irrigation Branch in the Department of the Interior, regards the periodicity of wet and dry years as fairly well established, although it has not been precisely determined. He regards the dry years as numbering from

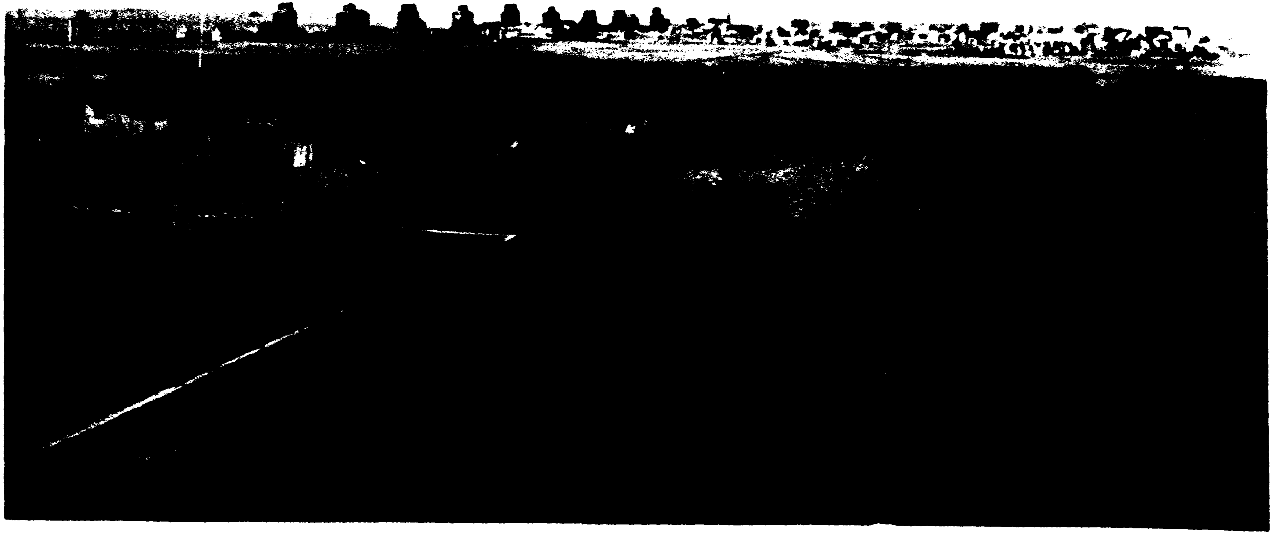

PLATE XV INDIAN HEAD, SASKATCHEWAN: GRAIN-ELEVATORS AND PRAIRIE

(Office of the High Commissioner for Canada)

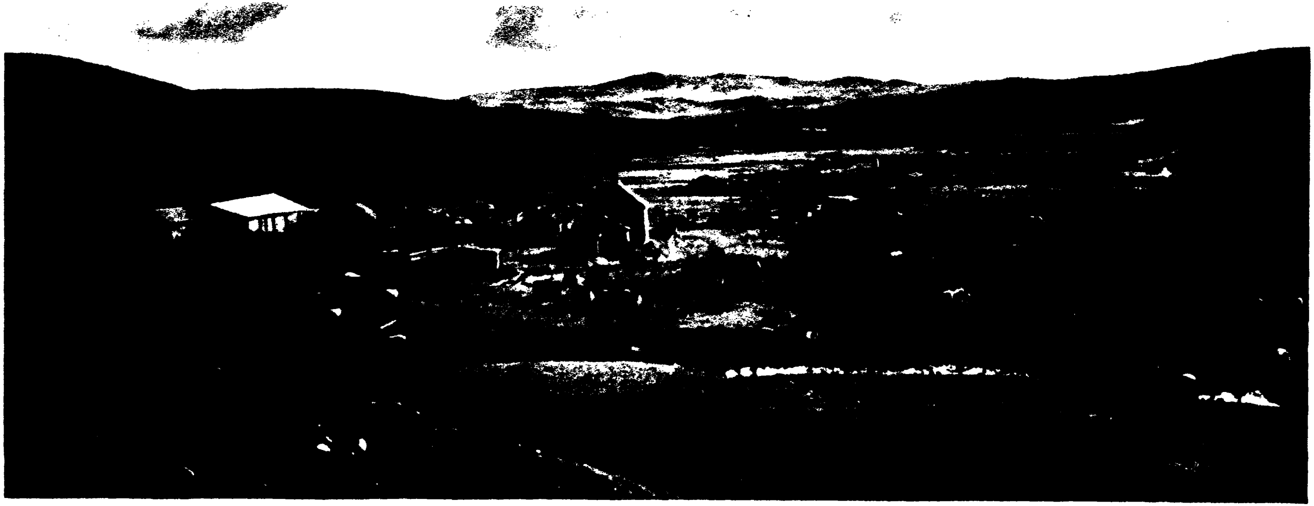

PLATE XVI. CYPRESS HILLS, SASKATCHEWAN

(Office of the High Commissioner for Canada)

three to six in succession, followed by three to six relatively wet years.[1] A large part of the dry region has been brought under irrigation by various systems, the chief being that of the Canadian Pacific Railway, by means of which eventually some 3,000,000 acres will be irrigated. Meanwhile, in the non-irrigated and in some of the non-irrigable parts of the region, dry-farming has been practised with advantage. Grasses like alfalfa, whose roots penetrate the soil to a great depth, thrive well on the dry bench lands. Brome and timothy yield immense crops under irrigation, and great quantities of vegetables are grown for the market offered by the mining towns of British Columbia.

Formerly cattle and horse ranching was the principal occupation in Southern Alberta; but the division of the country into homestead lots and the progressive settlement of it have rendered ranching impossible, excepting in the foothills and lower valleys of the Rocky Mountains. The beef grown on these smaller ranges is for the most part sent over to the mining towns in the mountains and to the coast towns beyond.

The north land of Alberta and Saskatchewan.

The northern portion of the province of Alberta and the north-western portion of Saskatchewan extend beyond the dry region. These areas are not so suitable for the cultivation of wheat as Southern Manitoba and the eastern half of Saskatchewan, but they are very suitable for the cultivation of oats and on the whole for mixed farming.

A tendency has been exhibited in this region to extend settlement into remote and isolated regions. This tendency has been encouraged by land speculators who have secured railway lands, and even by the government, which has not always been judicious in the opening to homestead settlement of regions which lie too remotely from markets for economical exploitation even when they are penetrated by railways. Such outlying regions are in general very variable, some of them, the Peace River Valley for example, containing stretches of useful land interspersed with large useless patches.

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[1] Cf. J. S. Dennis, *Irrigation in the North-West Territories of Canada, 1902*, Department of the Interior, Ottawa, 1903. Upon the relation of precipitation and evaporation, see also Mavor, *Report to the Board of Trade, 1904*, &c., pp. 8 *seq.*

The composition of society in Alberta is somewhat different from that in Manitoba and Saskatchewan, yet there are certain common features.

Socio-economic characteristics of the western portion of the central region.

(1) *Compact settlements.* There are no communities precisely resembling the stagnant communities of Manitoba and Saskatchewan. The Mormon settlements in Southern Alberta may more appropriately be called compact settlements than stagnant communities, although they cannot be regarded as so progressive in a commercial sense as the commercial farming community which is settled to the north. The Mormons have constructed a system of irrigation, and have engaged in the cultivation of sugar-beet and in the manufacture of sugar, the capital for these enterprises having been provided by themselves. They have also large herds of cattle. Sugar cultivation has not been entirely successful, owing largely to the difficulty of procuring suitable labour for the intensive cultivation which alone can be employed in growing beet. There is a relatively compact settlement of Galicians east of Edmonton, near the North Saskatchewan River, although the Galician population is also very widely distributed; and there was a compact British settlement at Lloydminster on the boundary between Saskatchewan and Alberta. This settlement is interesting because in the course of its development there emerged many of the difficulties which compact settlement appears almost invariably to encounter. A very large number of the original settlers were wholly unsuitable for pioneer agricultural life. The members of the settlement were not bound together by any specific bond, and thus the character of the settlement changed through defections and accretions until its originally compact character disappeared. Although this was not the original intention of the promoters, it was an inevitable and desirable consequence of a fortuitous

emigration,[1] chiefly from the provincial towns in the north of England.

(2) *Commercial farming groups in Alberta.* Although the seasons varied, and although on that account, and for the reason that the demand for cattle and horses was not invariable, ranching in Alberta was, on the whole, a profitable enterprise. A large capital was required to purchase the initial herd, and then it was necessary to wait for two or three years until the herd was sufficiently numerous to justify depletion for sale. The larger ranches were in general owned by joint-stock companies, the ranches being conducted by managers who usually had veterinary experience. The smaller ranches were owned by individual ranchmen who lived upon them. The successful ranchmen were either men of means or technical managers for joint-stock companies. During the ranching period the character of Albertan society was determined by the nature of the ranching system. Although the culture level tended to deteriorate on account of the isolation of individual members of the group, the aggregate number of well-bred Englishmen in southern Alberta was sufficient to give a certain character to the community. North of Calgary this character disappeared, and its place was taken by the sordid aggressiveness and acuteness in making small bargains which are characteristic of the American and eastern Canadian settler.

An economic position, intermediate in respect to the compact and semi-stagnant communities on the one hand and the commercial farming community on the other, is occupied by the large groups of immigrants from Austria, chiefly from the provinces of Galicia, Bukovina, and Ruthenia. These peasants are extremely frugal and industrious. Although they cannot be regarded as skilful or progressive farmers, they have succeeded in establishing themselves, and they enjoy a comfortable self-contained life. The rigidity of their self-contained polity, however, is gradually relaxing.

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[1] On the Barr Colony see Mavor, *Report to the Board of Trade*, 1904, and ibid., *Report Com. on Agricultural Settlements*, C. 2978–9, London, 1906. The latter contains a memorandum on the colony for the Departmental Committee.

(3) *The urban groups.* Since the ranching system and the system of commercial farming required and produced two distinct social types, the society of Alberta was thus from the beginning sharply divided into two fractions or classes—the ranchmen and the farmers. In general the first named lived in and about Calgary, while the second dominated the northern portion of Alberta and had as their social centre Edmonton, where for many years the Hudson's Bay Company had had a post. Their influence, increased as it was by the decay of ranching and by the increase in the farming population, sufficed to place the provincial capital at Edmonton rather than at Calgary, as well as to plant there the provincial university. As in Saskatchewan, the urban areas of Alberta have undertaken extensive municipal improvements. Both Calgary and Edmonton have tramways and other civic conveniences; and in both cities there have been periods of excessive speculation in urban land. Among the urban groups there are the workers of the coal-mines at Lethbridge and at various points on the Alberta side of the Rocky Mountain range. The coal-miners are of diverse racial origin; there are among them a large number of Italian immigrants. In Canada the Italian rarely intends to become a permanent settler. He usually works for a few years until he accumulates some means, and then sails for Italy, where his small capital is used advantageously in the revived agriculture of Calabria.

CHAPTER VII

ECONOMIC SURVEY *(continued)*

WESTERN AND NORTHERN REGIONS—GENERAL CONSIDERATIONS

BY PROFESSOR JAMES MAVOR

THE WESTERN MINING, FISHING, AND LUMBERING REGION

Extent and settlement.

THIS region may be held to comprise both slopes of the Rocky Mountains and the valleys of the numerous subsidiary ranges which lie parallel to the main range between it and the Pacific Coast. The region extends from the boundary between the United States and Canada on the south to the boundary between Canada and the Territory of Alaska on the north.

The economic exploitation of this immense region (about 400,000 square miles[1]) has been impeded by the meagreness of the population in relation to the area and by consequent difficulty in procuring the necessary supplies of capital. These conditions have resulted from numerous causes, of which the following are the most conspicuous. The ease with which the prairie soils might be exploited and the relatively slender amount of agricultural capital required for their exploitation offered greater attractions for settlement upon them than did the valleys of British Columbia, where the magnitude of the forests and the character of the minerals rendered the exploitation of these difficult and slow and required a relatively large amount of labour and of industrial capital. The distance of the region from Eastern Canada, and therefore from the Atlantic ports, made the journey longer and more expensive than the journey to the central plains. Thus the prairies captured the mass of immigration, while British Columbia had to rely upon migration from the plains and upon the immigration of relatively well-to-do people, who found the climate and the life agreeable but were not fitted to grapple with the industrial problems presented by forests, minerals, and estuarine fisheries.

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[1] The area of British Columbia alone is 355,855 square miles (by map measurement); see *Fifth Census of Canada, 1911*, vol. i. Ottawa, 1912, p. 38. The population was 392,480 or 1·09 per square mile (ibid.).

Divisions of the population of British Columbia: capitalist group.

The population of British Columbia may be divided into the following strata:

(1) The settlers, chiefly from Great Britain direct, and to some extent also from Ontario and Manitoba, who have gone to the country with some means and have established themselves chiefly in fruit-farming in the wide valleys between the mountain ranges, have, as a rule, taken comparatively small lots of land, and have devoted themselves to fruit culture mainly by means of their personal labour. They have brought with them certain traditions of European culture, which many of them do their best to maintain. To this group may be added another group of persons who have settled in the country either directly from Great Britain or from Eastern Canada and Manitoba, who have brought with them important amounts of capital and in addition have had the advantage of credit. They have embarked in lumbering, canning, and mining enterprises, and have especially in past times promoted railway schemes which have either been absorbed in larger enterprises or have been abandoned.

Labourers.

(2) Miners, lumber workers, and other artisans, general labourers, and domestic servants, of greatly diversified racial origins. Among these are to be found some Indians belonging to aboriginal tribes of the region, migrants from eastern Canada of British, French, and other origins, immigrants from the United States of various origins, immigrants from Great Britain, or descendants of these, immigrants from continental Europe—Scandinavians, Italians, Austrians and Hungarians, Germans, Belgians, Bulgarians, and Russians—Asiatic immigrants—Chinese, Japanese, and Hindu (of Asiatics altogether 30,000 by the census of 1911).

The region thus affords an example of a highly heterogeneous society, in which the social contours are sharply defined, a usual condition where numerous races are represented in a numerically small community. Labour disputes in British Columbia have, therefore, a character somewhat different from that of labour disputes in the east. There is no solidarity of the interests of labour, and yet the capitalist groups are so small that in the mass the influence of labour upon all legislation is great, although its direction is not determined by consideration of interests of the labouring population as a whole.

The labour situation in British Columbia.

Nevertheless, in spite of the heterogeneous character of the population of British Columbia, and the consequent difficulty of organizing labour, the trade unions have exercised a considerable amount of power, especially since the gold fever of 1896. The trade unions of British Columbia practically owe their organization to the unions in the neighbouring American States on the Pacific slope. The conditions in these states and the industries are very similar to those of British Columbia. There has always been much coming and going, especially of American miners, and it was necessary for the American trade societies to assist in the organization of similar bodies across the line as a measure of self-protection. Since the organization in the United States in 1905 of the Industrial Workers of the World, it has secured its chief support from the Pacific states and from British Columbia. This body has been organized in opposition to the American Federation of Labour, as a protest against the alleged subserviency of that body to the mechanism of party politics. The Industrial Workers of the World profess the doctrine of syndicalism and advocate sabotage, although they repudiate violence against the person. According to the newspapers which are devoted to the propaganda of the 'I. W. W.', the conditions of labour in the lumber camps in the States of California, Oregon, Washington, and Montana are very bad. It does not appear that the same conditions prevail in British Columbia, but the organization of the lumber jacks there prevents strikes in the coast states from being compromised by the influx of workers from the north.[1]

Asiatic labour.

The complicated question of Asiatic immigration cannot be fully discussed here. It may, however, be provisionally put in the form of a dilemma. The immense resources of the country cannot be developed without a very much greater supply of labour than is now available. The economical inducements are great enough to attract Asiatic labour ; but are not great enough to attract labourers of European origin in sufficient numbers. These circumstances throw a preponderance of power into the hands of the workmen of European origin. They are thus able to impede the immigration of Asiatics, and even that of Europeans. Wages are so high, and the risk of labour disputes so great, that capital is deterred from investment. But in the nature of the case large capital is required to conduct exploitation in the region, owing to the nature of its resources. The labour situation thus tends to produce an *impasse*. On social and political grounds the objections to Asiatic immigration are mainly these. If immigration were unrestricted, surplus population would pour out from China and from Japan, and British Columbia would become rapidly a colony of Asia. The result would be still more sharp social division. The Asiatic would be the only labourer, and the only other constituent of society would be a capitalist class. From the political point of view, under such circumstances, British Columbia would be at the mercy of any Asiatic power which might be able to secure the control of the Pacific. If the region were predominantly populated by Asiatics, the holding of it as an outpost of European civilization might be problematical. The Hindu immigration question is complicated by the circumstance that the Hindu is a British subject, and is not averse from insisting upon full recognition of what he considers his rights as a citizen of the Empire.

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[1] On the Industrial Workers of the World, see, e.g. *Solidarity*, weekly, Cleveland, Ohio ; and especially on the lumber industry, *The Lumber Jack*, weekly, New Orleans.

The trade unions of British Columbia are in general hostile to immigration of any kind, but they are especially hostile to the immigration of Asiatics. The ground of this hostility cannot be regarded as merely economical: there is at its foundation a deep racial prejudice which is shared by all classes. Notwithstanding this prejudice, and notwithstanding the poll-tax of $500 which has been imposed upon Chinese on entering the country, Chinese continue to arrive in British Columbia in large numbers. The disturbed state of China in 1911 and afterwards, resulting as it did in the disorganization of industry and in chronic disorder, caused a great increase of emigration from China to the countries to which it was possible for the Chinese to emigrate. They went in immense numbers to the Straits Settlements; many went into Manchuria, and increasing numbers crossed the Pacific to British Columbia, the United States being closed to them. The Chinese do not underbid the European labourers, but they are much more frugal, and after they have succeeded in meeting their obligations to the companies which finance them for passage-money and their poll-tax, they accumulate means rapidly. They remit in the aggregate large sums to their relatives in China, and these sums are frequently employed in the education of younger members of their families in the schools at Hong Kong, from which place they go to make their fortunes in the Straits Settlements, or the money is lent in mortgage to other families whose members pursue the same course. The method of employing Chinese in British Columbia is precisely the same as the method adopted by Europeans in China. All labour contracts in China are concluded with a comprador, who pays the men and is responsible for them. So also in British Columbia a Chinese functionary performs the office of comprador, engages the labourers, and pays them, the Chinese labourers being undoubtedly sharp enough to notice if he takes for himself more than the customary 'squeeze' or commission.

Japanese are not subject to the poll-tax, but by arrangement with the Japanese Government labourers cannot pass directly from Japan to British Columbia. They can do so, however, via the Hawaiian Islands. A considerable number of Sikhs have immigrated either from Hong Kong or from India, and some of them have acquired property in Vancouver; but their pugnacious disposition, together with the racial prejudice against them, have rendered them unpopular in the community.

The Indians of British Columbia.

The aboriginal population of British Columbia consists of numerous tribes, some of which have affiliations on the Pacific Coast as far south as California. The Athapascans, or Déné, are the principal group. This large stock includes the Loucheux in the far north, the Tsé'kéhne in the Rocky Mountain valleys, the Beavers near the Peace River, the Nah'ane on the Stikeen River, the Ts'ets'ánt on the Portland Canal, and others.[1] The next most important group are the Kootenays, whose habitat is south-eastern British Columbia and the adjacent portions of Idaho and Montana.[2] Then follow the Salish, a group which embraces a large number of tribes on the coast of British Columbia and the states of Oregon and Washington. The Bilqula, the coast Salish, the Shushwap, and the Okinākēn are the principal tribes of this group.[3] The Nootkas, or Kwakintl-Nootkas, form a large group of over twenty tribes, chiefly on the west coast of Vancouver Island. This group is specially interesting because of the intricacy of its social organization.[4] Other important groups are the Tsimshian on the Nass and Skeena Rivers in north-eastern British Columbia,[5] and the Haida of Queen Charlotte Islands and on the mainland.[1] Apart from the special languages and dialects of each linguistic stock, the coast Indians in general speak a *lingua franca* called Chinook. The basis of this jargon appears to have been the Chinook language which was formerly spoken in the region.[2]

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[1] The literature concerning the Athapascans is extensive. For indications, see Pilling's *Bibliography* (1892) and the two bibliographical volumes of the Smithsonian Institution, Washington. See also A. F. Chamberlain, 'Ethnology of the Aborigines,' in *Handbook of Canada*, British Association, Toronto, 1897, and the numerous reports of Dr. Boas and others to the Ethnographical Committee of the British Association in the annual *Reports* from 1889 onwards.

[2] See *Report* by A. F. Chamberlain, British Association, 1892.

[3] See Reports by F. Boas, ibid., 1889–96, and Papers by Dr. G. M. Dawson, in *Geological Survey Reports* and *Transactions of the Royal Society of Canada.*

[4] Sproat (1868) and Boas (Brit. Assoc., 1889, 1890, and 1896) are the most important authorities upon the Nootkas.

[5] See Boas (Brit. Assoc., 1889, 1895, and 1896).

The fishing population.

(3) The fishing population consists largely of aboriginal Indians, Chinese, and Japanese, with an admixture of members of the various racial groups mentioned above. The Chinese are employed in the fish-canning establishments owing to the dexterity which they have developed in the technique of the business of canning. Fishing is necessarily a seasonal occupation. After the season is over the Indians customarily go to Vancouver in their own craft, receive payment for their catch, purchase supplies of clothing, &c. for the winter, and then retire to the seclusion of their villages on the coast to the north. Japanese and Chinese sometimes go to their respective countries for the winter, returning in the following season. With a view to the prevention of permanent Chinese settlement, the immigration of Chinese women is prohibited, with indubitably disastrous moral consequences.

The urban groups.

(4) The first urban settlement in British Columbia sprang up round Fort Victoria, the Hudson's Bay Company's post on Vancouver Island. This settlement grew into the city of Victoria, which became the provincial capital. The earlier settlers were adventurous French-Canadians who made their way across the Continent, and Englishmen who sailed round Cape Horn. While the urban population has become highly heterogeneous, the English group remains an important social factor, although politically it has been submerged by migrants from the eastern provinces. The latter form the effective commercial element in the city of Vancouver, which owed its origin to the fact that the Canadian Pacific Railway chose the site as its terminus. The different racial

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[1] See papers by Dr. G. M. Dawson and F. Boas, *loc. cit.*

[2] Chamberlain, *Handbook*, Brit. Assoc., Toronto, 1897, p. 124.

groups are usually segregated within the towns, as is customary in the towns of eastern Canada and in those of the United States.

Mining in British Columbia. The difficulty of procuring labour and the refractory character of the ores have rendered the gold areas of southern British Columbia much less remunerative than the optimistic anticipations of 1896 suggested. The metals which are found in quantity in British Columbia are gold, silver, lead, copper, and antimony.[1] Smelting is carried on at Nelson, Trail, and Vancouver. The precious metals, however, are not refined in Canada. Pig lead is produced at Trail, and copper ingots at Nelson.

Fisheries of British Columbia. The most economically important fish of the Pacific Coast is popularly known as the salmon. The fish, however, belongs not to the genus *salmo*, but to the genus *oncorhynchus*. Of this genus there are in the rivers and on the coast five species: *O. nerka*, or Sockeye, otherwise known as the Blueback; *O. tschavĕcha*, or Spring Salmon, otherwise known as the Quinnat; *O. kisutch*, or Silver Salmon, otherwise known as the Cohoe; *O. keta*, or Dog Salmon, otherwise known as the Bécard; and *O. gorbusca*, or Humpback. Of these the most important species is the first mentioned, the Sockeye. The fish usually weighs from 3 to 10 lb., although larger specimens are sometimes obtained. The adults found in sea-water are spotless, above the lateral line they are blue, and below it they are white. At spawning time in the upper waters of the rivers they become red on the back and sides, and the tails become green. The flesh of the fish is deep red. The Sockeye enters the Fraser River in April, but at that period it is too small for capture. The season—the opening of which is regulated by law—begins on July 1, and the 'run' is usually in full vigour between the end of that month and August 10. The numbers of Sockeye which enter the Fraser River appear to be subject to periodical

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[1] The Annual Reports and the Special Reports issued by the provincial Department of Mines (British Columbia), Victoria B.C., contain much useful information on the gold-fields and other mineral areas.

variation. The 'run' seems to reach a maximum every fourth year, and a minimum in the year following.

The Spring Salmon, or Quinnat, is the next most important fish. It attains a much greater size than the Sockeye—18 to 30 lb., and even occasionally up to 100 lb. The back, the dorsal fin, and the tail are generally covered with round black spots, and the back is dark green, below the lateral line the colour is silvery white. At spawning time the fish becomes black. The colour of the flesh varies from red to pink, and even white. The fish enter the Fraser River in the spring, and the 'run' continues throughout July. Only those of the Spring Salmon which have red or rich pink flesh are customarily accepted from the fishermen by the canneries. The Cohoe is about the same size as the Sockeye, but unlike it, is spotted. It 'runs' in the Fraser in September and October, after the Sockeye 'run' is over. The Dog Salmon are caught almost exclusively by the Japanese, by whom they are shipped to the markets of Japan and China. The Humpback makes its appearance towards the close of the Sockeye 'run'. It is in less demand than the latter, but owing to its abundance it is in some years canned extensively.

The Sockeye appears to enter the Fraser River from the open sea to the north-west through the Strait of Juan de Fuca. The precise route of the 'schools' depends upon the wind and the tide. The size of the meshes of the nets, and the size of the nets by means of which the fish are caught, are prescribed by Dominion regulations. The canning season usually extends over six weeks, Chinese men and Indian women are employed extensively in the canning factories, the fishing being done by Chinese, Japanese, Indians, and white fishermen. The dimensions of the salmon export trade, now very large, may be ascertained from the annual Reports of the Dominion Department of Marine and Fisheries.[1]

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[1] Most of the details in the text are derived from a paper by J. P. Babcock, Commissioner of Fisheries, in *The Year Book of British Columbia*, by R. E. Gosnell, Victoria, B.C., 1903, pp. 213 *seq.* See also ibid., 1911, pp. 203 *seq.*

Lumbering in British Columbia.

The most important of the forest trees of British Columbia is the Douglas fir (*Pseudotsuga Douglasii*). This magnificent tree, which sometimes attains a height of three hundred feet, and a circumference of fifty, is distributed over the greater part of southern British Columbia It disappears about 55° N. lat. The largest trees are found on Vancouver Island and near the coast on the mainland, where they flourish under the influence of the warm, moist winds from the Pacific Ocean. The average height of the trees which are cut for bridge timbers, wharves, and other structural purposes is 150 feet, and the circumference usually between seven and ten feet. The logging operations are similar to those which have been described as being carried on in eastern Canada, but as the trees are much larger than in the east, the operations have all along been conducted on a larger scale. In former days the huge logs were drawn to the rivers along prepared skid ways by teams of sixteen or more horses or oxen; now they are hauled by steam power. There are numerous saw-mills through all the lumbering regions; but the principal mills are at Vancouver. The red cedar (*Thuya gigantea*) or giant arbor vitae, the yellow cypress (*Thuya excelsa*), the western white pine (*Pinus monticola*), the lodge-pole pine (*Pinus Murrayana*), the Engelmann spruce (*Picea Engelmanni*), the Menzies spruce (*Picea Sitchensis*), the coast hemlock (*Tsuga Mertensiana*), the western white oak (*Quercus jacobi*), the aspen poplar (*Populus tremuloides*), the broad-leaved maple (*Acer macrophyllum*), the western white fir (*Abies grandis*), and the western yellow or bull pine (*Pinus ponderosa*) are among the other common trees which are cut and used for commercial purposes. Several of the trees mentioned are suitable for the manufacture of pulp. Leases of timber lands are granted by the provincial government on rental and royalty terms.[1]

The forests of British Columbia are much denser than those of eastern Canada, and logging operations can

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[1] Ibid., 1911, pp. 255 *seq.*

PLATE XVII. SAWBACK LAKE, ROCKY MOUNTAINS

(Office of the High Commissioner for Canada)

PLATE XVIII. PARKDALE, SUMMERLAND, BRITISH COLUMBIA

(Office of the High Commissioner for Canada)

[illegible] be carried on with greater economy. The average cut per acre in British Columbia is about ten times the amount of the cut in Ontario. The development of the Prairie Provinces has afforded an increasing market for British Columbian timber. There have been long periods when the supply scarcely met the demand. In addition to the domestic market, the existing, and still more the potential market is widely extended—the United States, the west coast of South America, Australia, and Japan offer the largest markets.

Immense quantities of timber are destroyed annually by forest fires. When the occurrence of a fire and of a cyclone are coincident, as sometimes happens, great areas are altogether denuded, and the fire-weed (*Epilobium*) marks the places where the forest had formerly been.

Fruit-growing in British Columbia.

A large part of the area of British Columbia is well suited as regards soil and climate for the growth of fruits. The range of tree-fruits includes apples, pears, peaches, plums, and cherries, and that of small fruits, strawberries, raspberries, and red and black currants. The regions in which fruit-growing has become a large industry are in the neighbourhood of Vancouver, in portions of the Arrow Lakes on the Columbia River, and in the Okanagan Valley. The possibilities of fruit-growing, however, are by no means confined to these regions. The British Columbia government has been directing inquiries into the portion of the province lying to the north of the Canadian Pacific Railway, and some parts of that region are reported upon favourably. In the neighbourhood of Vancouver the valuable orchards are few in number, but important: apples, pears, and plums are grown successfully. Much remains to be done in the selection of varieties especially susceptible of adaptation to the conditions of the country. The local market absorbs practically all the production of the region.

In the Okanagan Valley irrigation has been applied to the fruit farms, and the yield has been rendered larger and more certain. The growing of fruit practically began in this region in 1892, with a small irrigation scheme which was subsequently widely extended. The irrigated lands are under the control of joint-stock companies who charge a rental for the use of water, which is in one case brought from a distance of thirty miles. The organization of the market for fruit is in the hands of one private firm, one joint-stock company, and one co-operative enterprise—the Farmer's Exchange. Apples are sent from the Okanagan Valley to the London market, but in general the domestic demand is fully equal to the supply, and in some years prices of fruit have been very high. The climate of southern British Columbia is moister and more genial than that of eastern Canada, even in an inferior latitude ; and the seasons are less liable to violent fluctuations. The real difficulties in fruit-culture arise from the scarcity of labour during the picking and packing period, and from defective management. The scarcity of labour appears to be due partly to the slender numbers of the population as a whole, partly to the concentration of these in the towns, partly to the difficulty of determining beforehand how many pickers may be required, and partly to failure to organize the migration of labourers at the fruit-picking time. The fruit-growing business is indeed largely in the hands of amateurs, who have not yet succeeded in organizing the industry in such a way as to produce fruit sufficiently uniform in quality and sufficiently well packed to compete in Vancouver, for example, with the products of the fruit gardens of California. Yet owing to the demand local prices have been high, the industry has been profitable, and the prices of developed fruit lands have risen from £100 to £200 per acre.[1]

THE NORTHERN REGIONS

Mining in Yukon territory.

The occupations of the people of the northern regions are mining, fishing, and hunting. The only mining region of importance is the Yukon Territory, in which gold is mined from the gravels either of existing or of earlier river beds. The discovery of gold on the Stewart River in 1895 and 1896 led to the rush to the Klondike in immediately succeeding years. The readily accessible gold having been recovered by the thousands of prospectors who precipitated themselves upon the country, the exploitation of less easily obtainable gold has come to be carried on by means of scientific methods and by the employment of hydraulic and other machinery. The population, which was considerable in 1898, has diminished, and the conditions of life in the mining camps have greatly altered.

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[1] W. H. Bunting, *Report of a Special Inquiry into Fruit Growing Conditions in Canada, 1911*, Ottawa, 1912, pp. 45 *seq.*

The mineral wealth of other regions is undoubted, but only as the regions are approached by settlement or by sustained advance over the intervening valueless spaces can the necessary means of transport be provided, and even then the remoteness of the regions from the centres of consumption must remain a permanent disadvantage so far as exports from the regions are concerned.

Aboriginal inhabitants.

The aboriginal tribes of the north are too numerous for any catalogue to be attempted. They may, however, be broadly regarded as consisting of two great groups, the Eskimo, or Inuits, and the Indians. The former fish during the summer, and hunt during the spring and autumn; they occupy the northern coast region, migrating from summer to winter camps. The latter hunt during the year, migrating with the seasons and with the herds upon which they depend for subsistence, occupying in a measure the region south of that occupied by the Eskimo. The Hudson's Bay Company has many posts throughout the region, although they do not enjoy a monopoly of the fur trade.

GENERAL ECONOMIC CONSIDERATIONS

Commercial and banking law.

The commercial law of Canada is based upon English Common Law, excepting in the province of Quebec, where law in general is founded upon the Code Napoléon. There is no bankruptcy law in Canada. In case of insolvency a creditor may apply to the courts for the appointment of an official assignee, and the estate may then be liquidated under the authority of the court. The debtor may be released from further obligation on the surrender of his estate to his creditors, but this does not necessarily follow. In any case he is not declared a bankrupt.

Under the British North America Act,[1] the Dominion Parliament has the exclusive power of legislating in respect to banks. The custom is to pass a general Bank Act which applies to all banks. This Act is usually passed decennially, although the Act which should have been passed in 1911 was not introduced until 1913.[2] Any person may carry on the business of a banker; but the power to issue notes is reserved for banks chartered under the Act. The capital of a banking company is issued in shares of one hundred dollars each, and shareholders are liable in case of failure of the bank to meet its engagements to the extent of another hundred dollars. That is to say, the shareholder is liable to an amount equal to the amount of his original subscription.[3] The capital of all chartered banks must be at least $500,000. A bank may issue notes to an amount equivalent to its unimpaired capital, plus the amount of current gold coin and of Dominion notes deposited by the bank in the ‘ central gold reserves ’, which are in the custody of the Dominion Treasury. The notes are secured by means of a mutual system under the control of the government. Each bank maintains in the hands of the government a fund consisting of an amount equal to five per cent. of its note issue, and in case of any bank failing to redeem its notes the aggregate funds so deposited by the banks is called upon to meet the notes of the defaulting bank, the funds being then replenished by means of a call upon the banks which remain solvent. The amount due upon notes issued by a bank forms a first charge upon the assets of a bank, and no claim upon the special reserve for the security of notes has arisen.

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[1] 30 Vict. c. 3 (1867).

[2] The Bank Act of 1913 is 3 & 4 Geo. V. c. 9 (Dom. of Can.). Twenty-four banks are mentioned in Schedule A ; thirteen banks were, on the date of the Act, in process of absorption by the banks in Schedule A or were in course of liquidation.

[3] The Bank of British North America, which was established under an Imperial Act, is not under the clause of the Canadian Act imposing double liability.

Mercantile finance

The foregoing survey has shown that although the industries of the Dominion are considerable, the people are predominantly engaged in extractive industries. It has also shown that the population has increased rapidly rather by immigration than by natural increase. Even if the immigrants bring with them into the country a certain amount of liquid capital, the actual expenses of their settlement in a new country must in general exceed that capital. They must build houses for themselves; they must cultivate at least a portion of their land; they must sow for their first crop, and they must also possess or secure subsistence practically for the first year of their settlement, until the returns from their labours begin to appear as income. From the beginning, therefore, unless they have adequate agricultural capital in their own possession, the farmers must borrow. So also the manufacturers who embark upon new enterprises must, unless they possess adequate means, obtain credit or must borrow the necessary industrial capital. The governments—Dominion, provincial, and municipal—must also borrow, so must the railway companies and other companies which render public services. In a country which has rapidly increased in population from comparatively small to relatively large numbers, there cannot in the nature of things be any considerable domestic accumulation of capital. Thus the borrowing must to a large extent be effected abroad, either directly by those who desire the funds for their own use, or indirectly by financial institutions which embark in the business of the interposition of credit. The extent to which such borrowing is possible is determined partly by the external conditions of the money-market in general, and partly by the extent to which the borrowers in question are worthy of credit. Personal reliability being assumed, they will be worthy of credit in respect to the extent, not of their resources at any given time, but in respect to their resources in the future and the likelihood of their being able to offer sufficient security that these resources will be available, and that the stipulated interest will be duly paid. In the case of a government or a municipality entering the market for loanable capital, it is necessary that the taxable capacity of the people be declared or understood; in the event of a company or an individual entering the same market it is necessary that the earnings of the immediate future be declared. The rate at which the loan is obtained must consist of three elements—the net rate of interest, the cost of managing the transaction, and the premium of insurance against the loss of the principal. Owing to the highly competitive character of the money-market, the first element will necessarily be practically universally the same at any given moment, the other elements will vary with the conditions of the transaction, the locality of the borrower, the likelihood of his being able to meet his engagements, and other circumstances of a like character.

Financial relations of Canada with Britain and other countries.

Application of these general considerations to a country in the position of Canada will show that the gross rate of interest for a loan effected in Great Britain must be sufficient to overcome the reluctance of lenders of money to allow their funds to be sent to a great distance, qualified by the consideration that the commercial law of Canada in general terms resembles that of Great Britain, and that in the last resort an appeal may be made to the Judicial Committee of the Privy Council. The resulting rate will therefore, other things being equal, be less than would be exacted for funds which might be sent to Turkey or to China, where the political conditions are disturbed, or even to the Argentine, where certainty regarding the course of law cannot be felt. For some of these reasons and to the extent suggested, Canada may be said to have a preference in the British money-market which she would not have in any continental money-market, or even in that of the United States, although her proximity to the latter might give her a preference under certain conditions.

In order that she may be able to exploit her natural resources, and, indeed, in order that she may be able to provide for the needs of her growing population, Canada has been obliged to borrow, and circumstances have impelled her to borrow in Britain, not merely because that country possesses the largest money-market but because her connexion with Britain enables her to borrow on better terms there than anywhere else. At the same time there has been a considerable amount of voluntary investment in Canada of funds from other countries, induced by the attractiveness of Canadian securities—notably from Holland, Germany, France, and the United States.

The future of Canadian mercantile finance.

The aggregate of the borrowings of Canada during past years has been very great; and it is an important question whether or not there is reasonable likelihood of the interest upon the loans and investments being punctually and continuously paid in general, individual cases of mistaken judgement in lending or in investing being left out of account. It would be inappropriate to attempt a decisive answer to such a question in this place; but the constituents of a possible answer may be suggested. The principal related questions are, how has the money been expended, and if it be shown that the money has been expended in forms that are likely to be productive, how soon will this productiveness begin to yield interest, and in certain cases amortization of the invested funds? The answer to the first question may be gathered from an examination of the character of the imports into Canada during recent years, since it is obvious that the funds which have been lent have been introduced into the country in the form of imported goods. Such an examination would reveal that by far the larger proportion of the total imports has consisted of structural material for railways, and for buildings connected with them or with industrial enterprises. In so far as the imports consist of food stuffs in general consumption, these also may be regarded as having been productively consumed. When due deduction has been made for articles of luxury, it is very evident that the bulk of the imports could not be consumed otherwise than in the main productively.

Application of borrowed moneys to railways;

The answer to the second question is more difficult. In so far as the loans and investments have been applied to railway construction, it may be taken for granted that a few years must elapse before the railways in question begin to yield a return to capital newly invested in them. This is the case with all railways; but it is peculiarly the case with Canadian railways because of the great distances which they must traverse, and because they are necessarily frequently constructed in scantily occupied regions into which they carry a population, which eventually may be expected to produce a paying amount of traffic. This process takes time, and during the period which must elapse the credit of the railway company may be strained in managing the financial arrangements necessary in order to enable it to tide over the period of non-production. While the experience of other countries shows that over-production of railways may take place, there cannot be said to be any positive evidence that this has occurred in Canada.

and to immigration and industries.

In so far as the funds realized from external loans have been devoted to the settlement and maintenance of immigrants and to the establishing of new industries, the return to these under normal climatic conditions may be held to be almost certain. Experience shows in general that three or four years at most suffice for an immigrant to establish himself in such a way that he can look forward with equanimity to the discharge of his obligations. But if a succession of inferior harvests supervene this relative certainty would be diminished.

Transportation

The Canadian canoe.

The serration of the country by rivers and glacial lakes offered to the aboriginal inhabitants means of movement by light craft, which could be carried across the land separating two water systems. The craft which they adopted was the canoe made of birch bark, bent to the required form, the sections being laced together and the seams covered with pitch. The birch-bark canoe might be made for accommodating from one to twenty persons or more. The desiderata for a canoe for a long journey are that it should be seaworthy, light for the portage, and that it should be easily repaired. When skilfully made and skilfully guided, the birch-bark canoe offers these advantages. The basswood canoe has now almost replaced the birch-bark vessel, because of its greater strength, elegance, and, when properly made and managed, safety. Throughout a large part of the hunting regions of eastern Canada the canoe is not merely the best, but the only means of locomotion. While travelling in the summer is amphibious, it is not so in the winter. When the lake region is covered with ice it is possible to drive in a straight line, regardless of the interruption of water areas. The winter is thus the period for rapid movement. For example, when the channel of the St. Lawrence north of the Island of Orleans is frozen, and the ice is thick, about Christmas time the *habitant* of the region brings out his *voiture*, which has probably been little used in the summer, and drives with as many of his family as the vehicle can hold to Quebec.

Winter roads.

Highways.

In the spring the streams from melting snow scour or flood the roads, and in the autumn heavy rains sometimes make them almost impassable. The earliest roads in the eastern region were tracks in the forest, rendered passable in soft places by branches being laid on the track, or by logs sawn to the width of the track being laid side by side across it. The latter are known as corduroy roads. The plank road made of sawn lumber laid crosswise was a comparatively late development in eastern Canada. It has been superseded by macadamized roads, although the high price of skilled labour and the scarcity of good road-making material have retarded the development of communications.

The question of highways is always a difficult one in a scantily populated country, and is still more difficult where abrupt changes in temperature and in conditions of moisture deteriorate the roads irrespective of traffic. Propagandas and highway commissions have done something to improve the roads in eastern Canada, but on the prairies the roads are much worse than their predecessors the prairie trails were. The latter could be readily extended laterally by encroachment upon the unbroken surface of the prairie, and their direction could easily be turned in such a manner as to avoid depressions, whether these were swamps or not. When the prairie lands came to be divided into square sections, the road allowances were set out along the section lines, irrespective of the formation of the land, and thus the roads run straight, up and down hill, through swamps and *coulées.* They are thus seldom constructed in any sense, and they cannot therefore be said to be kept in repair.

The construction of railways has bridged the long distances; but roads are necessary as feeders for railways, and must be provided if the railway is to maintain itself, and if the produce of the country is to find a market.

Ocean and coastwise traffic.

The most important ocean ports on the Canadian coast are Halifax and St. John; the important ports of Quebec and Montreal are on the St. Lawrence River far inland. The coastwise trade between Nova Scotia and New Brunswick on the one side, and the coasts of Maine and Massachusetts on the other, is considerable, as is also the coastwise trade between the British Columbian coast and the ports of the States of Washington and Oregon, as well as between the Canadian harbours—Vancouver, Victoria, Nanaimo, Prince Rupert, &c.—and Skagway in Alaska, which is on the most convenient route to the Yukon Territory.

The ocean traffic on the Atlantic is conducted mainly in the summer from the river ports of Quebec and Montreal, and from Halifax (Nova Scotia), and St. John, New Brunswick. A very large portion of the Canadian ocean trade, however, is conducted through Portland, Maine, Boston, and New York. The ocean traffic on the Pacific is conducted from Vancouver and Victoria, both of which possess fine harbours. A ship-repairing yard has been established at Esquimault, Vancouver Island, by Messrs. Yarrow & Co. of the Clyde.

The amount of steamship subventions and mail subsidies authorized by statute is about £70,000, and the amount annually voted for the same purposes is about £350,000, or a total of about £420,000. These subsidies include river, lake, and canal, as well as coastwise and ocean services.

River, lake, and canal navigation.

Inland navigation plays a very important rôle in Canada. The great interior lakes and their connexions constitute a water chain, by means of which grain and other produce are transported from the interior to the ports for ocean shipment. There appears to be no doubt that under existing conditions of land and water transportation, the wheels cannot meet the competition of water. The bulk of the wheat for export, for example, is conveyed as soon as possible after harvesting to the lake ports of Fort William and Port Arthur, and is there shipped on grain vessels to be carried via Buffalo for shipment from New York; to Depot Harbour, Georgian Bay, Lake Huron, for conveyance by rail to Portland, Maine; or to Montreal for transhipment to ocean-going vessels.

Since the most economical vessel for ocean traffic is a large, deep vessel, and that for lake, river, and canal navigation is relatively small and of comparatively light draft, it is clear that there is not necessarily any net advantage in loading at Port Arthur for Liverpool without transhipment. The traffic in such a case would be largely a one-way traffic, and therefore would not be economical. The Canadian canals are, therefore, constructed for vessels of comparatively light draft, the necessity for transhipment being assumed.

Railways.

The conditions which cause the chief problems in the railway situation in Canada are the long distances which separate the important centres, and the absence of mutually compensatory exchange between the centres. These long distances, moreover, are not occupied to an extent sufficient to afford local traffic of moment. The results of these conditions are that the traffic is seasonal, and that it is predominantly one-way. The most important of the long distances are those which separate the St. Lawrence Valley and Montreal from Nova Scotia, the region which separates the industrial portions of Ontario and Quebec from the Red River Valley, and the parallel mountain chains which separate the plains from the Pacific Coast. All the three transcontinental lines have thus to encounter many hundreds of miles of unremunerative haulage.

Transcontinental lines.

The first transcontinental line, the Canadian Pacific Railway, which was constructed in the beginning entirely on political grounds, has become, chiefly through the energy and skill of its officials, a great commercial success. It has played a large part in building up the country. The route of the main line was so designed as to be the most direct between the Pacific Coast and the Red River Valley.[1] The consequence of this has been the necessity of constructing numerous branches and radial lines both north and south of the main line. The Canadian Pacific Railway has been able, out of earnings, not only to pay a relatively high rate of dividend, but to rebuild practically the whole line, to replace the temporary wooden bridges with permanent steel structures, and to shorten the route through the mountains by means of tunnels.

The Grand Trunk Pacific Railway,[2] which constitutes the transcontinental extension of the Grand Trunk Railway, has constructed a portion of its transcontinental system by means of capital raised upon the guarantee of the Canadian government, and has leased from the

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[1] See *Survey and Preliminary Operations on the Canadian Pacific Railway*, by Sandford Fleming, Engineer-in-chief, Ottawa, 1877, and subsequent reports.

[2] The original agreement between the Dominion Government and the Grand Trunk Pacific Railway Company is to be found in the Dominion Act, 3 Edw. VII. c. 71 (assented to October 24, 1903); supplemental agreements are in the Sessional Papers, e.g. No. 37a, 1904.

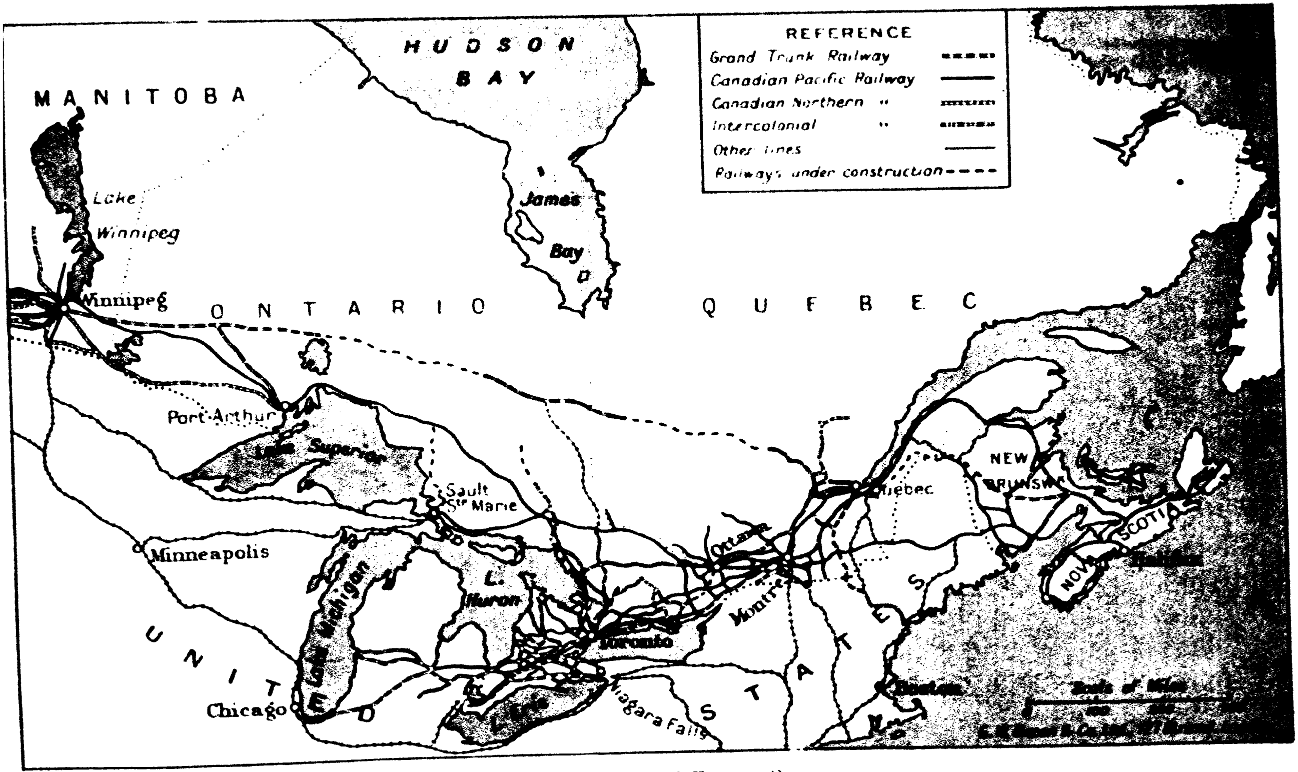

Fig. 11. Railways of Eastern Canada.

government the National Transcontinental Railway which has been constructed at the cost of the government. Both portions of the system have been built in accordance with the policy which was adopted when the original Grand Trunk Railway was built in eastern Canada, in the middle of the nineteenth century. This policy involved the construction of the line in a permanent manner at the beginning, in order to avoid the subsequent necessity of practically reconstructing it out of earnings. The wisdom of the adoption of this policy half a century ago, while the country was in a rudimentary stage of development, may be doubted ; but the wisdom of its adoption now, when the line had to compete with a system thoroughly equipped and thoroughly permanent, cannot be questioned. The line traverses the continent nearly parallel to the Canadian Pacific Railway, but at varying distances to the north of that line, connexion between them being effected by branches. The wisdom of placing the terminus of the Grand Trunk Pacific so far north on the Pacific Coast as Prince Rupert remains to be proved.

A third transcontinental line has been partially constructed by the Canadian Northern Railway Company. This line, which has been in progress since 1895, has been built in the same manner as nearly all the railways on the American continent, that is, in a manner just sufficient to carry the anticipated traffic for a period of years, the improvements which are necessary to render the line permanent being left to be accomplished gradually out of surplus earnings. The company has been assisted by Dominion and provincial guarantees and land grants.

The only other railway of first importance in Canada is the Intercolonial Railway, which was built by the Dominion in order to connect the Maritime Provinces with Quebec and Ontario, and was from the beginning, therefore, rather a political than a commercial enterprise.

These great trunk lines having been completed, the railways of the future must necessarily be mainly branch and connecting lines. The provision of these may be gradual, and thus the borrowings of the country on rail-

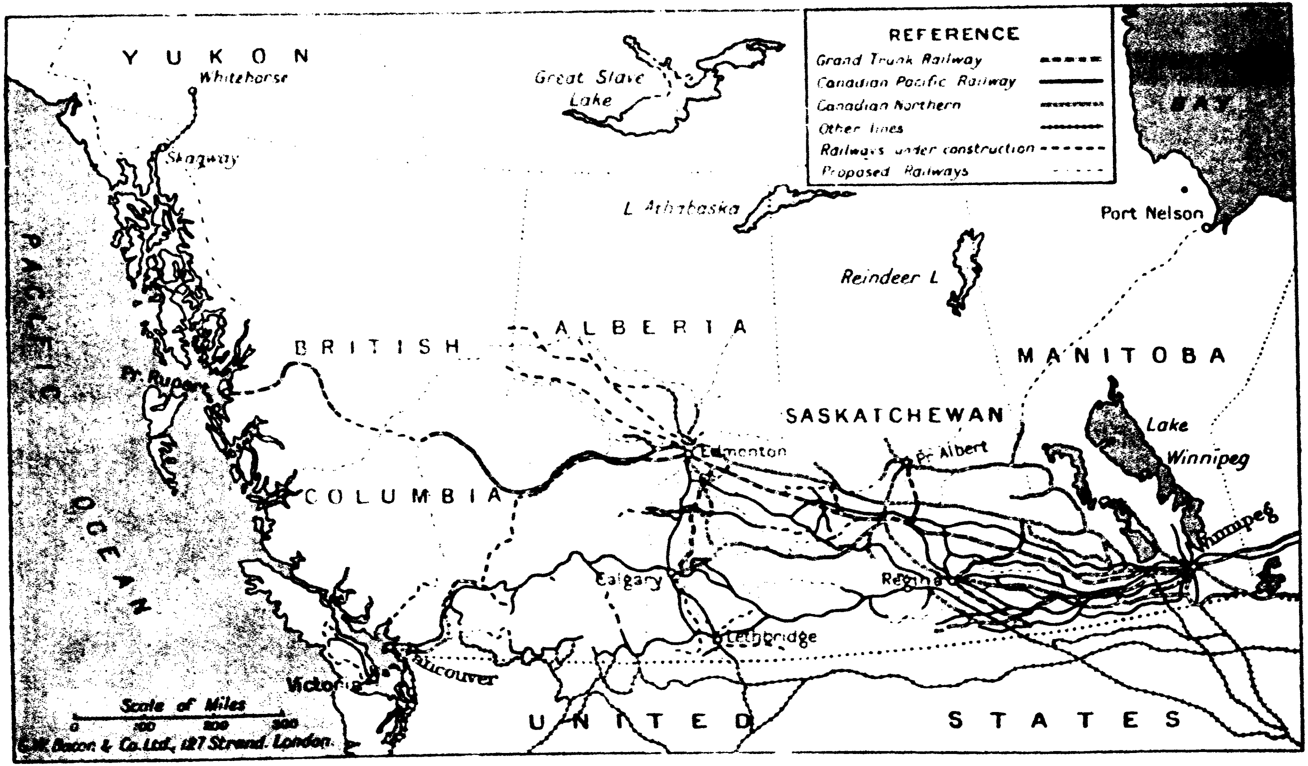

Fig. 12. Railways of Western Canada.

way account are not likely in the immediate future to be so great as they were from 1900 to 1913.

The public administration of railways is in the hands of a Ministry of Railways, and also of a Railway Commission.[1] The latter has powers somewhat similar to those of the Interstate Commerce Commission of the United States. The National Transcontinental Railway is under a separate commission. In Ontario there is a Railway and Municipal Board [2] which deals with railway questions within the province; and there is in addition a Commission for the management of the Ontario Government Railway in Northern Ontario.

Electric railways.

There are independent interurban and radial electric railways in nearly all the provinces. These lines sometimes, though not invariably, occupy a portion of the public roads and link up many of the smaller towns. They have not been constructed upon any uniform system, and most of them belong to small local companies. These lines are, in general, served by hydraulic power, those within a radius of about one hundred miles from Niagara Falls being, for the most part, served by current conveyed at high potential and 'stepped down' at the place where the power is utilized. The important development of the future is likely to appear in the increase of radial lines from the lake towns, and in the improvement of the connexions between these lines and the urban railway systems. The principal technical problems may be regarded as consisting in the reconciliation of high speed and frequency of service on public thoroughfares already sufficiently crowded by ordinary traffic, and in the provision of suitable connexions between the urban and interurban lines. The principal administrative question is whether the urban railways should be owned and administered by the municipalities or by joint-stock companies. The magnitude of the capital expenditure, and the difficulties in which the technical services of municipalities are customarily involved, have hitherto limited any considerable development of municipal enterprise in this direction.

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[1] See Annual Reports of the Railway Commission, Ottawa.

[2] See Annual Reports of the Ontario Railway and Municipal Board, Toronto.

Labour, Commerce, &c.

Organization of labour.

The organization of labour is more effective in the eastern and western industrial regions than in the central region, where agriculture largely predominates; and it is more effective in the industrial portions of Nova Scotia and Ontario than in the similar portions of the province of Quebec. The development of the labour movement in Canada has followed the same direction as the movement in the United States.[1] Excepting during its earlier years the Canadian movement has been slenderly influenced by the movement in Great Britain. The growth of trade unionism in Canada has been slow and fluctuating, and its progress has been at once stimulated and hampered by its international character. In Ontario and in Nova Scotia the close proximity of the eastern industrial region of the United States, and the frequent migrations across the border in either direction, have rendered the international union necessary from the labour point of view. But the international union has occasioned the development of difficulties peculiar to itself. Questions about the collection and administration of union funds in two different countries have arisen constantly, and the non-payment of dues by the Canadian unions has occasionally led to their being cut off from the international unions. When strikes occurred in Canada, employers have been more than usually reluctant to meet the representatives of their men, when these representatives came from rival industrial centres in the United States. While the unions in the United States have stimulated the formation of branches in Canada, there can be little doubt that the international union is to some extent responsible for the fact that there is no labour party, in the political sense, in Canada. This condition has also been contributed to by the circumstances that the wage-earners are scattered over an immense area in proportion to their total numbers, that relatively few of them are concentrated in any one place, and that the organizers of the two political parties have dealt shrewdly with the labour leaders. Labour questions have thus been confined to the purely economical plane, and have not been thrust into the sphere of party politics. In the Dominion and in the provinces alike both parties conciliate the labour vote, and probably divide it nearly equally between them. Individual labour members have occasionally been elected in the Dominion and in the provincial legislatures. The appointment of arbitration and conciliation boards has been facilitated by legislation, and in certain cases such boards have been advantageously employed in the settlement of minor disputes. In more important strikes, however, they cannot be said to have been effective, no means of compelling workmen to work on terms determined by a board, or of compelling employers to carry on their business on terms similarly determined, having yet been found.

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[1] *Report on Labour Organization in Canada, 1911*, Ottawa, 1912; id., *1912*, Ottawa, 1913, and *Report on Strikes and Lock-outs in Canada from 1901 to 1912*, Ottawa, 1913.

The Bureau of Labour of Ontario was established by an Act of the Provincial Legislature on April 25, 1900.[1] A Department of Labour for the Dominion, which had been founded in 1900, was erected in 1909 into a separate Ministry of Labour, the minister having a seat in the Cabinet.[2] The Bureau of Labour of Ontario is merely a statistical office for the collection of data concerning trade unions. The Department of Labour of the Dominion exercises much wider functions. To this department is confided the working of the Industrial Disputes

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[1] The Ontario Bureau of Labour issues annual reports which are published in the Dominion Sessional Papers.

[2] The organ of the Dominion Department of Labour is *The Labour Gazette*, which is published monthly at Ottawa. It contains reports of proceedings under the Industrial Disputes Investigation Act, and chronicles the movements of wages and prices.

Investigation Act, 1907. Under this Act arbitrators may be appointed in cases of industrial dispute.

Import trade.

The imports into Canada from the United Kingdom are chiefly the following: cotton and woollen manufactures, paper, paints, iron and steel manufactures, lead and zinc, machinery, leather, glass, drugs, carriages, and books. The imports from the United States are animals, books and periodicals, breadstuffs, bricks, carriages, coal, cordage, raw cotton, drugs, electrical apparatus, fish, fruits, furs, glass, grasses, rubber, leather, brass, copper, agricultural implements, iron and steel fittings and forgings, other iron and steel manufactures and machinery, mineral oils, paper, paints, provisions, seeds, sugar, vegetables, wood, and woollen manufactures.

Export trade.

The chief exports of goods produced by Canada to the United Kingdom are cattle, breadstuffs, fish, fruits, furs, leather, metals, mineral oil, paper, provisions, timber, and wool. The chief exports to the United States are breadstuffs, animals, coal, fish, fruits, copper, iron and steel manufactures, paper, provisions, salt, seeds, and wood.

SUMMARY

Economic history.

The economic history of Canada has, in a general sense, followed that of the United States. Although the settlement of Acadia and New France was nearly coincident with that of Virginia and New England, the latter was carried on with more vigour than the former. While the French colonies were adding territory to territory, the English colonies were consolidating their position and were building up compact settlements. The political status of the French and the English colonies was changed almost simultaneously, the former passing into the hands of Great Britain, and the latter acquiring independence. The rapid growth in population of the United States and the national ambitions drove that country into the industrial revolution, which in the early part of the nineteenth century affected western Europe profoundly. The land policy of the United States contributed with other causes, notably the immigration of poverty-stricken Europeans, to the formation of a large proletarian class. The accumulation of capital, the foundation of which had been laid in the Colonial Period, provided the means for the exploitation of the proletarian mass, which continued to pour into the country. The results of this exploitation were the concentration of the mass, and the growth of the great cities. There were three reasons why Canada could not follow immediately the United States in this industrial expansion. There was in the early part of the nineteenth century no capitalist class in Canada. The French-Canadians had not been touched with the furore of industrialism, and the English were poor and without skill in industrial affairs. There was no proletarian class; the French *habitant* had his land, and the English settler could get land also on no onerous terms. The third reason was that so far as was known in the early part of the nineteenth century, in the absence of the means of communication, the mineral and other resources were at too great a distance from the settlements which had been formed, and there was no product like cotton which could be made the subject of manufacture.

The National Policy: tariffs.

Canada had thus to wait until the gradual growth of the population and the gradual growth of capital and credit enabled her to provide the means of communication which were necessary to connect the interior with the sea-board. But, meanwhile, the United States had gone far. Her industrial production was even outrunning her domestic demand ; she began to seek foreign markets. Canada lay at her doors, and the products of American factories might find even a readier sale there than in the west, where the distance over which goods had to be transported was much greater. The growth of the policy of protection which resulted partly from financial exigency, and partly from the inheritance of colonial days, reacted upon Canadian opinion, and the pressure of a period of depression re-enforced this opinion. The result of these influences was the adoption of what came to be known as the National Policy. Although the protective tariff was imposed by a Conservative government, it was continued by a Liberal administration until the Conservative party came once more into power. Under it a number of new industries had come into existence; American manufacturers had crossed the line and established factories in Canada. Wages and prices had adjusted themselves to the higher level which a policy of protection involved. It would have been quite impossible without dislocation of industrial and commercial relations to have made any serious modification of the system of protection. The Liberal party even established a system of bounties in order to encourage the manufacture of iron and steel. Moreover, the duties originally imposed for purposes of protection became necessary for purposes of revenue. The division of taxable areas among the Dominion, provincial, and municipal governments practically forced the Dominion government into a policy of indirect taxation. The public lands, saving those in the North-West Territories, had been handed over to the provincial authorities, and there was no other large possible source of direct revenue. The Dominion might have imposed an income or a property tax, but public opinion would have been opposed to any such expedient. The expenditures of the Dominion in the provincial subsidies, in the subsidies to railways, in the construction of canals, harbours, &c., demanded some important and elastic source of revenue, which might be counted upon to expand with the prosperity of the country. These considerations, together with the fear that a modification of the tariff might produce industrial disturbance, sufficed to produce the defeat of the Liberal government on the proposal to adopt a policy of reciprocity with the United States. Some weight ought also, no doubt, to be attached to the fact that the rising spirit of nationality was hostile to any measure which might seem to make in the direction of political absorption.

Economic problems.

The chief economic problems which Canada encountered at the beginning of the twentieth century were:

how to develop the lines of communication in such a way as to secure economic independence; how to induce immigration in sufficient numbers and of a suitable character in order to occupy her immense territory; and how to foster the credit of the country in such a way as to induce the flow towards it of the capital which was necessary for the exploitation of its resources.

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CHAPTER VIII

POPULATION AND CULTURE

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Immigration and Settlement

Immigration: administration.

IMMIGRATION into the Dominion of Canada is under the control of the Minister of the Interior, who administers the Immigration Acts, and makes such regulations to control the movement as may be necessary from time to time. By statute, certain classes are prohibited from landing in the Dominion, among them being persons mentally or physically defective, diseased persons, criminals, beggars and vagrants. Exceptions may be made by the minister under some conditions, the object being to keep out those who would be a moral or physical danger or those likely to become a public charge. Persons whose passages are paid by any charitable organization, or out of public moneys, must obtain permission in writing from the Superintendent of Emigration. Within three years after landing, any person who has become a public charge, has been convicted of an offence, has become insane, or is in other ways undesirable, may be deported.

In the winter months an adult immigrant may be required to have in his or her possession, on landing, $50 and a ticket to destination: from March 1 to the end of October, the cash requirement is only $25, and a proportionate sum in each case for children. Farm labourers and domestic servants, however, going to assured employment, may be admitted without respect to the money they possess. There is a poll tax of $500 on Chinese, and all immigrants must reach Canada by continuous journey from the country of their birth or citizenship on through tickets purchased in that country or purchased or prepaid in Canada. The Dominion government has no system of free or assisted passages, nor does it give free transportation on the railways, but there is a special immigrant rate quoted by the railway companies for new arrivals in connexion with their ocean passage tickets.

Nationalities of immigrants.

In the fiscal year 1900–1, the total immigration was just under 50,000, made up of 12,000 British, 18,000 from the United States, and 20,000 from other countries. Since that date there has been an almost continuous increase, until in 1911–12 the immigration reached a total of 354,200, of which number over 138,000 were British, 133,700 from the United States, and over 82,000 from other countries. Their destinations were given as 16,000 to the Maritime Provinces, 50,000 to Quebec, 100,000 to Ontario, 43,000 to Manitoba, 46,000 to Saskatchewan, 46,000 to Alberta, and 50,000 to British Columbia. Of the immigrants from the United Kingdom, nearly 97,000 were English and Welsh, 33,000 Scotch, and 8,300 Irish: those from 'other countries' included nearly 22,000 from Austria-Hungary, 5,000 from Germany, 10,000 from

Russia, 5,000 from the Scandinavian countries, 5,000 from France, Belgium, and Holland, and 6,000 Chinese.

Political and economic considerations.

Immigrants from the United Kingdom are specially desired, not only for their inherent qualities but to balance the foreign element, and to help the Canadians to preserve the traditions and characteristics of the British race, and maintain that spirit of loyalty to the Empire which pervades the country in such a marked degree to-day. It is not thought that this will be weakened by the large immigration from the United States which has been taking place during recent years. A great proportion of these people are stated to be either Canadian born or of Canadian descent, and the others, of various nationalities, quickly identify themselves with the country of their adoption. The material from the United States is of the best possible character, composed as it is of experienced tillers of the soil coming from a region where agricultural and climatic conditions are similar to those in the North-West Provinces of the Dominion. Besides being men of fine character, physically strong, and of quick intelligence, the incoming American farmers bring a substantial amount of capital, the average being calculated at $1,000 per head in either cash, stock, or effects. The adaptability of the American farmer would in any case make him a valuable acquisition to the country, but his capital and experience result in his at once becoming a most successful settler.

Immigration of children.

Another very successful section of the immigration work is that connected with the children, orphans and waifs and strays sent out by philanthropic societies, and poor-law children emigrated by British boards of guardians, who act through the recognized societies. These must have receiving homes in Canada from which to distribute the children, and to serve as homes for them should the necessity arise for their return at any time before they reach the age at which the societies cease to be responsible. The government has a department specially engaged in the supervision of this work, and its reports testify to the satisfactory results which are achieved. Applications are received for a far greater number of children than are available, many being from people wishing to adopt one. Great care is taken to choose good homes, which are afterwards visited periodically, and if the surroundings and treatment are not satisfactory the children are removed and placed elsewhere. Only a very small proportion has to be returned to England owing to ill health or misconduct, but of course the children have been chosen for suitability in the first instance. In the year 1911–12 the number of children emigrated from the United Kingdom under this system was 2,668, while the applications received in the same year for children amounted to 31,000, making it evident that a great expansion of this movement is possible if the authorities in Great Britain will send the children out.

Government provisions for immigrants

The immigration most desired by the Canadian government is that from the United Kingdom, France, Germany, Austria, Holland, Belgium, Denmark, Norway, Sweden, and the United States, and as active a propaganda as is allowed is maintained to bring the advantages of settlement in Canada before the peoples of the countries named; but apart from those persons who have more or less capital which will enable them to take advantage of the innumerable opportunities they can find to establish themselves, the only positive encouragement given by the Dominion government is to immigrants of the domestic servant class and to those who wish to follow an agricultural pursuit. To all such, if they are physically strong and otherwise suitable, the government guarantees employment. The rapidly extending cultivation of the country by the farmer is of course being followed by developments in other directions—villages are becoming towns, and towns are quickly growing into cities, with industries and distributing facilities of all kinds, but the Dominion government does not seek to promote the immigration of professional men or mechanics as such, nor of women incapable of taking or unwilling to take work as domestic helps. If these classes go out they do so entirely on their own responsibility. Female domestic servants are in great demand, the wages ranging from 25*s*. to £3 a month in eastern Canada, and from £2 to £4 a month in the west. Cooks are paid from £2 to £4 in private families, and higher rates in restaurants and hotels.

The government has immigration halls at many centres at which newly arrived immigrants may stay for a few days without charge for shelter and bed, but they must provide their own food. For women there are also special hostels, some of them subsidized by the government, at which board and lodging is provided at a nominal charge, some of them being free for the first day. In addition to the government agents, various church and national organizations do considerable work with a view to lending a helping hand to new arrivals, and special attention is paid to female immigrants by committees of the societies affiliated with the National Council of Women.

Settlers on the land.

Speaking broadly, it is better for every intending settler on the land to take employment with a farmer for a period to acquire a knowledge of Canadian methods and conditions. Most men who have had agricultural experience will find one season sufficient to make them acquainted with the differences which exist between English and Canadian methods. Inexperienced men may require a longer time, and before starting it is well they should realize that the life is one of hard and continuous work. Its exactions may not be quite as great in some directions as farm work at home owing to the more general use of machinery, but as a rule the hours are longer than those worked by an English farm hand. Any one with the necessary physical strength can be placed in a situation by the government agents, and the wages earned will be from £20 for the novice to £40 for the experienced man the first year, rising to £60 after Canadian training. These rates are in addition to board and lodging. Generally the hired man lives in the house with the farmer and fares in exactly the same way whether it be well or ill—and the variations are considerable.

The independent farmer.

Having gained experience, the settler's next step is to start farming on his own account, and the amount of capital at command will probably decide the question whether to take up a government homestead, or to purchase wild land or an improved farm from a private owner or from a railway or land company. Particulars are given elsewhere of the terms on which government land is obtainable. Assuming choice is made of prairie land in the west, the cost of the homestead would be nothing beyond the registration fee of $10. Probably the intending homesteader has some general idea of the district or part of the country where he would like to settle, and he presents himself at the land office there to consult the maps, which are corrected from day to day, for vacant quarter sections (160 acres), and make inquiries as to their character. These are given him from the surveyors' reports, and he may find some one, a guide or government official, who can speak of them from personal observations. Taking note of several vacant lots, he goes out to make his selection, and having decided on one he returns to pay his registration fee. To find a desirable homestead within easy distance of a well settled centre is not to be expected, and rather than take poor land it is better to go into a new district, keeping in mind the probability of a railway being built in that direction, this being specially important for the man whose object is wheat farming. As his produce has to be 'teamed' to the railway, along which the elevators are built, his proximity to his market has a great influence on his profits.

Capital requirements.

With a capital of £250 a man of experience can make a fair start, as that sum will enable him to erect a house, buy a team, machinery and some stock, and live until he has raised a crop. With industry 40 acres may be broken the first year, ready for sowing the following year, and with good fortune 800 to 1,000 bushels of wheat may be harvested, worth £100 or more at the elevator. In addition, he would probably produce sufficient food of various kinds for stock to meet the needs of the homestead. Each year a larger acreage would be brought into cultivation, and soon after he has obtained the patent for his land he would be in possession of a farm which could be readily sold for £500. This cannot be done without great industry and self-denial, but it represents the early history of many successful farmers who now own large areas of land. Success has been reached by many who started with less than the capital named, but the struggle was necessarily keener and longer. On the other hand, men with more capital may buy wild land near railways and settlements, or purchase farms more or less in cultivation, thus ensuring ready access to markets and avoiding the isolation which is for a time the almost inevitable lot of the homesteader.

Those who settle on government lands outside the prairie districts, in Ontario and other provinces, must farm on different lines, as the ground is generally timbered and requires clearing. In such cases mixed farming is the course it is necessary to pursue, and the returns, while not so immediate, are less subject to the vagaries, of the weather and are ultimately as satisfactory.

Education and Religion

As each province has the control of its own educational system, it is necessary to examine the regulations of each to acquire a comprehensive knowledge of the whole, but the following particulars, while revealing important differences in methods, show that the democratic principle exists in all.

Ontario.

Ontario is justly proud of its educational system, of which the following are the principal features: a division of State and municipal authority; clear lines separating the function of the university from that of the high schools, and the function of the high schools from that of the public or elementary schools; a uniform course of study; all high and public schools in the hands of professionally trained teachers; the examination of teachers under provincial instead of local control; a common matriculation examination for admission to the universities and to the learned professions; a uniform system of text-books; the system national instead of sectarian, but affording under constitutional guarantees and limitations protection to Roman Catholic and Protestant separate schools and denominational universities.

The province is for the most part divided into counties, which are subdivided into minor municipalities, consisting of townships and incorporated villages, towns, and cities. Through their municipal councils, counties are under obligation to make grants of money to high schools, and both counties and townships must contribute certain sums in aid of public schools, but much the greater part of the money required is raised locally. Each township is divided into school sections, and each of these sections is provided with a public school. There is a board of trustees for each school section, incorporated village, town, or city, elected by the ratepayers, men and women, who, within the regulations of the Education Department, appoint the teachers and determine the amounts to be expended for buildings, equipment, and salaries. The government, however, grants the certificates of teachers and inspectors, authorizes the text-books, fixes the courses of study, and prescribes the duties of trustees, inspectors, and teachers.

There is no Established Church nor any connexion between Church and State, and no religious body has any voice in the management of the high or the public schools or the university, but recognition of religion is shown in the regulations of the Education Department, which provide that every public and high school shall be opened with the Lord's Prayer and closed with the reading of the Scriptures and the Lord's Prayer or the prayer authorized by the Department of Education, but no pupil is compelled to take part. The clergy of any denomination have the right to give religious instruction to the pupils of their own church, in each school house, at least once a week after the closing hour in the afternoon. Teachers who have conscientious objections to the religious exercises are relieved of that part of their duty.

Each board of trustees has power to establish kindergartens for children between the ages of four and seven years, and the system has been introduced into all the large cities and many of the principal towns, a small fee being generally charged.

Townships are divided by their municipal councils into sections, each of which has its own school (a few have two schools) managed by a board of three trustees, who hold office for three years, one going out of office annually. A grant of money is paid by the government to each school according to the average attendance of pupils, and the county council is obliged to make an equal appropriation. In addition, the township council must give a grant of $100 ($150 if two teachers are employed) to each school, and the ratepayers are taxed to raise whatever further sum the trustees require to maintain the schools, which are all free. It may be interesting to note that in rural schools agriculture is one of the compulsory subjects. Cities, towns, and incorporated villages also receive their share of the legislative grant for public schools, and the balance necessary is raised by the municipal council. The public school board consists of six or more members, two elected from each ward. As in the rural schools, the public schools are all free, and free text-books may be provided or a small fee be charged for their purchase. Night schools may also be established.

It is held that as the State gives the boon of free schools to all it has a right to see that the expected advantages are realized, and consequently it makes attendance between the ages of eight and fourteen years compulsory, certain exceptions being allowed.

From the primary school, a pupil may pass on examination to the high school, which is maintained by (1) government grants, (2) county grants, (3) district or municipal grants, and (4) fees of students. The question of free high schools is left to be determined by each locality, this option having been found more satisfactory than making all high schools free by Act of Parliament or fixing a uniform fee for the province. About one-third of them are free and the fees in the others vary from $2.50 to $26 per year. High school examinations are held at the same time and on the same papers in every high school, and the student who passes may secure a certificate or certificates which will admit him as a matriculant to any university in the province ; to the School of Practical Science ; to a course of study in law, medicine, dentistry, or pharmacy ; to a course of theology in any divinity school or some other institution for the professional training of teachers. To have a permanent licence to teach in a public school it is necessary to obtain at least a second-class certificate, which can only be secured by those who have attended the normal school, but the higher positions in the teaching profession are open only to the graduates of the School of Pedagogy.

The Roman Catholics of Ontario have certain educational privileges guaranteed to them by the Act of Confederation. All ratepayers, no matter what their religious belief, are liable to pay 'public' school rates unless they become 'separate school' supporters. The term 'separate schools' applies to Protestant and coloured persons as well as to Roman Catholics, but in practice the exception to the general public school system is confined chiefly to Roman Catholics who desire to establish separate schools in localities where their supporters are sufficiently numerous for the purpose. It is provided that any number of heads of family, not less than five, being residents of the place and Roman Catholic, may unite and establish a separate school. After the specified formalities they are exempt from the payment of rates towards the 'public' school. The separate schools are under government inspection, and are generally conducted in accordance with the same regulations as the public schools, the trustees being elected by the separate school supporters.

In order to secure a uniform standard of higher education by the union of various denominational universities with the provincial university, the University Federation Act, 1887, was passed. It was contended that a high standard could best be maintained where there are uniform examinations for graduation as well as for matriculation, and among other things that members of churches need not be taxed to maintain half a dozen universities to do work already provided by the State. It was moreover felt that all the advantages claimed for denominational oversight might be retained in connexion with the plan of university federation. A college federated with the University of Toronto carries on the same work as University College, and undergraduates, who for one hour of the day receive instruction in Latin or moral philosophy in different colleges, will meet together for another hour to receive lectures from university professors in mathematics, civil polity, chemistry, or some other subject. In addition to colleges devoted to technical instruction, the following denominational colleges are federated or affiliated: Victoria University (Methodist), Knox College (Presbyterian), St. Michael's College (Roman Catholic), Wycliffe College (Episcopalian), and Huron College (Episcopalian). Of those which are not affiliated are Trinity College, Toronto, connected with the Episcopal Church; and Queen's College, Kingston, connected with the Presbyterian community. The McMaster University, Toronto, is supported by the Baptists, while the Roman Catholic University is the University of Ottawa.

Quebec.

In Quebec a working arrangement has been devised which recognizes in large measure the rights of conscience, at least so far as two broadly distinguished types of religious belief are concerned, while maintaining effective government control, and securing to every school, whether sectarian or not, its national character, a problem which becomes really difficult when some disputable incidence of local taxation arises through difference of creed. In Ontario, the preponderance of Protestants, though smaller, is not less decisive than the preponderance of Roman Catholics in Quebec, and the solution of the difficulty of securing the privileges of the vast majority to the dissentient few, has been solved in each province in a different way.

The Council of Public Instruction is the body responsible for all important changes in the method of providing public education, and it has, within the limits set by statute and subject to the approval of the provincial government, full power to control the management of all schools. This council is divided into two committees, the one consisting of the Roman Catholic and the other of the Protestant members. The superintendent of education is *ex officio* chairman of the council and of each of these committees, but he is entitled to vote only in the committee to which he by religion belongs. The religious division thus begins with the central authority, and is met with in almost every detail of the local administration. The public schools of the province are classified as Roman Catholic or as Protestant schools, and no public school exists which is not identified with one or other of these religious classes.

The Roman Catholic members of the council (i.e. the members of the Roman Catholic committee) are:

1. The bishops, ordinaires or administrators of the Roman Catholic dioceses and apostolic vicariates, *ex officio* members.
2. An equal number of Roman Catholic laymen appointed by the lieutenant-governor in council.

The Protestant committee consists of Protestants equal to the number of Roman Catholic members appointed by the governor in council, who are appointed in the same manner. The lieutenant-governor therefore appoints the whole of the Protestant committee and one-half of the Roman Catholic committee. All appointed members hold office during pleasure. For all practical purposes each of the two committees of the council has the same statutory powers in regard to matters specially concerning education of its own religious faith, as the council which the two committees together compose has in regard to all matters not specially concerning one or other of them.

There is one special provision in regard to the constitution of each committee—the members of the Protestant committee may associate with themselves five members to assist them in their labours with the same powers as the ordinary members, but they do not form part of the council; and in regard to the Roman Catholic committee, each bishop, vicar apostolic or administrator of a diocese may appoint a delegate to represent him if he should be unable to be present at a meeting through illness or absence from the province.

The local authorities for public instruction are called school corporations, which means indifferently a corporation of school commissioners or school trustees, 'commissioners' being responsible for the schools of the majority and 'trustees' for the schools of the dissentient minority. The local areas are called 'School Municipalities'. The word 'municipality' does not imply the existence of a city nor necessarily even of a town within its limits. It is, in fact, merely an area bearing to the smaller areas—'school districts' (which may not exceed 5 miles in length or breadth)—a relation similar to that between an *arrondissement*, and the *communes* of which it consists, in France. The school municipality, then, consists of smaller units, the school districts, and the authority that deals locally with education in a direct manner is the school corporation of commissioners in the case of the 'majority' schools, or the 'trustees' in the case of the minority schools, who have been elected for any school municipality.

The following will indicate the difference between the functions of school commissioners and school trustees. If, in any municipality, the regulations and arrangements made by the school commissioners for the management of any school are not agreeable to any number whatever of the proprietors, occupants, tenants, or ratepayers, professing a religious faith different from that of the majority of the inhabitants of the municipality, they may signify their dissent in writing to the chairman of the commissioners, and on the date of the annual election they elect three trustees. If, in any municipality, the ratepayers who belong to the religious denomination of the dissentients become the majority, they signify their intention of organizing themselves in consequence. On the date of the next election they elect five commissioners, either for all the ratepayers, if the former majority, which has become the minority, has not declared itself dissentient, or for the majority alone if the minority has declared itself dissentient. Dissentients are not liable for any taxes or school rates which may be imposed by the school commissioners, nor, on the other hand, are members of the majority liable for the taxes levied by trustees. Arrangements are made to ensure either the provision of schools by dissentients or the payment of the taxes levied by the school commissioners, the representatives of the majority, and also for the education of children of dissentients where there is no school of their own religious faith in a neighbouring municipality.

Individuals of the dissentient minority cannot be elected to serve as school commissioners or vote at their election, nor can individuals of the majority, where there is a dissentient minority, be elected to serve as school trustees or vote at their election. Every person elected is bound to accept office, under a penalty, but he may not be re-elected without his consent within four years after going out of office, which is held for three years.

The duties of school commissioners and trustees are, among other things, to appoint qualified teachers, to see that the course of study authorized by their respective committees is carried out, and to see that no books are used other than those specified by the council or the committees—though it is provided that the priest of the Roman Catholic Church of the municipality has the exclusive right of selecting all books for the use of the pupils of his communion that have reference to religion or morals, and similar rights are secured to the Protestant committee in respect of pupils of communions other than the Roman Catholic.

The school commissioners and school trustees also levy the taxes in their municipality which they deem necessary for the support of the schools under their control, and the sum arising from such taxes must not be less than the sum allowed to such municipality out of the common school fund of the province. Certain property is exempt from school taxation, such as Crown property, buildings used for public worship, charitable institutions, and hospitals. Over and above the taxes levied, the commissioners and trustees fix the amount to be paid in monthly fees for the eight school months for each child of school age, from 7 to 14 years, and such fees may not exceed 40 cents, nor fall below 5 cents, per month. Attendance is not compulsory.

The facilities for superior education are provided by universities, colleges, seminaries, academies, high and superior schools, model schools, and educational institutions other than the ordinary elementary schools, and the superintendent of education apportions the grants for education, the division being made between the aggregate of the Roman Catholic and Protestant institutions respectively in the relative proportion of the Roman Catholic and Protestant populations of the province according to the latest census figures available.

The Roman Catholic Laval University is situated at Quebec and Montreal: the Protestant University of McGill at Montreal; and there is also the University of Bishops College at Lennoxville.

Nova Scotia.

The educational system in Nova Scotia provides free schools, the unit being the school section 4 miles in extent. In the rural district the governing body is composed of three trustees, elected by the ratepayers, and they levy the school tax. The funds for teachers' salaries are supplemented from two other sources—one is the county fund, which raises by statute a sum equal to 30 cents per head for each inhabitant, and the other is the provincial fund paid direct to the teachers, the amount to each depending upon the class of certificate held. In addition, the balance of the county fund is divided in proportion to the attendance of the children, and the province makes grants to county academy or high schools, which admit free any student passing the entrance examination.

In towns the trustees are known as school commissioners, 3 being appointed by the municipal council and 2 by the provincial government. In the city of Halifax there are 12, of whom the city council appoints 6 and the provincial government the other 6.

In the regulations issued by the education department religion is not mentioned as even an optional subject, but it is imperative to give instruction in moral and patriotic duties and inculcate by precept and example respect for religion and Christian morality. Devotional exercises are allowed if no parent objects, and in that event an attempt at modification is made to remove the objection. If this fails the exercise may be held immediately before opening the school for secular work or after its close, no pupil being compelled to attend. The trustees are assumed to understand the local conditions of their section and have large powers for regulating such exercises. In a few towns 'separate schools' have been established by Roman Catholics, and have won recognition from the local educational authorities.

A law is in existence requiring school sections to vote annually 'Yea' or 'Nay' on the question of compulsory attendance until it is adopted, after which it remains permanently in force. In Halifax and a few of the towns compulsory attendance is the rule. From the common schools students can pass to the high schools, making a twelve years' course, free. Trustees may open evening schools, and separate schools for boys and girls, but co-education is the general plan.

In addition to the elementary and high schools, there are a normal school for the training of teachers, a mining school, school of art, school of cookery, schools for the study of agriculture and horticulture, and the University of Dalhousie at Halifax, the University of King's College, Windsor, and the Acadia University at Wolfville.

New Brunswick.

In New Brunswick there are three ranks of schools under the state system—common, superior, and grammar or high school. The superior school is an advanced common school and both are free. The size of the school section is 4 miles, and the regulations in regard to trustees and finance are similar to those in Nova Scotia ; in towns, however, of the governing body, part nominated by the governor in council and part by the town council, two must be women. School attendance is not compulsory.

In regard to the question of religious teaching, the school law declares that all schools conducted under its provisions must be non-sectarian, and no dogmatic religious teaching is allowed. Practical Christianity, however, is encouraged, the teacher is directed to strive diligently to inculcate the principles and encourage the practice of Christian morality. In addition, the teacher has the privilege of opening and closing the school by reading a portion of the Scripture (from either the common or the Douay version) and repeating the Lord's Prayer. These religious exercises are purely voluntary and no pupil can be required to be present.

In towns most of the Roman Catholic children are grouped together in the same schools under teachers of their own faith, and this arrangement enables the children to be instructed in that faith either before or after school hours.

The University of New Brunswick is situated at Fredericton, and the University of Mount Alleson College at Sackville.

Prince Edward Island.

In Prince Edward Island the elementary schools are free, and the system under which they are carried on is so similar to those of New Brunswick and Nova Scotia that a repetition of the details is unnecessary.

Manitoba.

In 1871 a measure was passed in the provincial legislature, establishing a system of strict denominational schools, but provincial statesmen were not satisfied with the result. They felt that separate schools for Catholic, Episcopalian, Presbyterian, and Mennonite, for English, French, Hungarian, and Finn, perpetuated the barrier towards the creation of a homogeneous Canadian people by the diversity of language which fostered the separatist point of view on matters concerning the general welfare of the whole community. Considerations of economy and efficiency also had their weight. Finally, in 1890, a measure was introduced to the provincial legislature which applied the principle of undenominational education with strict logical consistency to all schools. This Act met with the most determined opposition from the Roman Catholics, and much litigation ensued and political animosity was aroused.

The Act remains in force, however, and under it free schools are provided wherever there are ten children of school age, but no school district may include more territory than 20 square miles. Children of non-resident parents or of parents whose property is exempt from school rates, may be called upon to pay fees not exceeding 50 cents per month. Attendance is not compulsory.

The schools are managed, as regards rural districts and towns and villages not divided into wards, by three trustees, and in all larger villages, towns, and cities which are so divided, by two trustees for each ward. The committees thus formed are called school boards, which may charge 20 cents per month for text-books to resident pupils, $1 to those non-resident, and $2 to those attending the collegiate department. They are financed by legislative grants, municipal grants, and local taxation as in the other provinces, and the authorities may also raise money by way of loan.

Intermediate schools are combined with ordinary public schools, and the collegiate schools are the secondary schools proper, entered after examination. These prepare pupils for the entrance examination of the University of Manitoba, to which certain denominational colleges are affiliated.

In the public schools religious instruction may be given in school hours, the regulations permitting the reading without note or comment of certain selected passages from the authorized English version or the Douay version of the Bible, and the use of a prescribed form of prayer.

Saskatchewan. In the province of Saskatchewan, the 'educational council consists of five members appointed by the lieutenant-governor in council, two of whom must be Roman Catholics, and they serve for two years. In this province a public school district must not exceed five miles in length or breadth, and must contain at least four persons actually resident and liable to assessment, and twelve children between the ages of 5 and 16 years. In a rural district attendance is compulsory for children from 7 to 13 for at least 100 days, 60 of which must be continuous in rural districts, and for 150 days if resident in towns or villages. The schools are free, but if one or more departments are maintained for pupils above Grade VIII fees may be charged to such pupils, not exceeding $9 for the first term, and $6 for the second term. Text-books are also free.

The schools are managed by trustees in the usual way, but the assessment rate may not be more than 12 mills in the dollar. Where there are 10 children between the ages of 7 and 14 in a rural district, the school must be open 140 teaching days in the year, or if 12 children live within a mile and a half, 190 days. In towns and village districts the time is 210 days. The board of any district have power to provide for the cost of the conveyance of children to and from school. In addition to the local assessment, there are grants from the legislature which are graduated to encourage the prolonging of the number of teaching days in the year and the employment of teachers with superior certificates.

Schools may be opened by the Lord's Prayer, but religious instruction may be given only in the last half-hour in the afternoon under regulations of the board, and no child is compelled to attend this lesson. Separate schools may be established by the minority whether Protestant or Roman Catholic, and the ratepayers establishing them are only liable to assessments of such rates as they impose upon themselves in respect thereof.

In the case of land owned by a Protestant and occupied by a Roman Catholic, or vice versa, the land is assessed for separate school purposes, to the owner. The University of the province is at Saskatoon.

Alberta.

The system of the province of Alberta is so similar to that of Saskatchewan that it need not be further described. The University of Alberta is situated at Edmonton, and the University of Calgary in the city of that name. Both provinces have normal schools for the training of teachers.

British Columbia.

A system of free education exists in British Columbia, with compulsory attendance between the ages of 7 and 12 years. There are 'school districts' and 'rural districts', the former including the schools established within the municipal boundaries of Victoria, Vancouver, New Westminster, and Nanaimo. In each city district there are one high school, two or more graded schools, and one or more ward schools. In rural districts only graded and common schools. They are managed by trustees as in the other provinces, a novel feature being that the wife of an elector may vote as substitute for her husband. Chinese and Indians have no vote.

The cost of the public schools in the cities is met partly by the city council and partly by the provincial government, which makes a *per capita* grant based on the actual attendance of the pupils. At high schools fees may be charged. In the rural districts the local assessment is supplemented from government funds also. Crown lands are set apart in a large number of school districts as school reserves. All public schools must be conducted on strictly secular and non-sectarian principles. The highest morality is inculcated, but no religious dogma or creed may be taught, though the Lord's Prayer may be used in opening and closing the school. There is a normal school for the training of teachers at Vancouver.

In almost every province agriculture is one of the subjects prescribed for the more advanced classes, and its study can be continued in the colleges established for that purpose.

Native Peoples[1]

Indian Reserves.

The great majority of the Indians are now in reserves which have been secured to them by treaties. It became necessary that they should be induced to abandon their wandering habits, under which living was precarious, and that steps should be taken for their improvement, and they were persuaded to settle down on reserves where they could be educated, receive instruction in agriculture, and in other ways learn to become self-supporting. Certain sums were distributed by the government on the signing of each treaty, and an annual payment fixed of $25 to each chief, $15 to each of three subordinate chiefs, and $5 to each member of the band, in addition to some cattle, seed grain, and certain agricultural implements. The treaties also stipulated that there is to be a school in each reserve, that no intoxicating liquor may be sold, and that the right be given to fish and hunt on unoccupied land in the district. These are the conditions under which the Indians now live, and while progress in the direction desired has not been rapid, taking all the circumstances into account, it is sufficiently good to be encouraging. But notwithstanding the sympathetic treatment accorded to them, and the efforts which are never relaxed to inculcate hygienic knowledge, their numbers are decreasing, being 104,956 in 1912, distributed as follows : Alberta 8,113, British Columbia 24,781, Manitoba 10,373, Nova Scotia 1,969, New Brunswick 1,903, Prince Edward Island 300, Ontario 26,393, Quebec 12,817, Saskatchewan 9,545, North-west Territories 5,262, Yukon 3,500.

Measles and whooping-cough are prevalent, with a much higher mortality than is caused by these diseases in the white races; but in the reports of the medical officers in every province the one disease which dominates, with a few exceptions, is tuberculosis. Every effort is being made to combat the scourge, but no doubt it will continue to prevail until there is a wider acceptance by the Indians of the information given them on the measures necessary for its prevention.

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[1] [See F. W. Hodge, *Handbook of American Indians North of Mexico*, Washington, 1907 seqq. ; F. Boas, *Kwakiutl of Vancouver Island*, New York, 1909 ; T. Crosby, *Among the An-ko-me-mums or Flathead Tribes of Indians*, Toronto, 1907 ; J. Teit, *Thompson Indians of British Columbia*, New York, 1900 ; and *The Lilloot Indians*, New York, 1906 ; C. H. Tout, *British North America : The Far West, the Home of the Salish and Déné*, London, 1907; also references on p. 172.]

Religion and education of Indians.

Their religions are: Anglican 19,056, Presbyterian 1,893, Methodist 15.324, Roman Catholic 41,114, Baptist 1.318, Congregationalist 20, other Christian beliefs 923, pagan 9.048. Their education is provided for by three classes of schools, to the support of which the Dominion Government contributes, the amount thus paid in the year 1911–12 being $745.000. The schools are conducted under the following auspices:

Undenominational, 47 day and 2 industrial schools.
Roman Catholic, 80 day, 30 boarding, and 9 industrial.
Church of England, 77 day, 13 boarding, and 4 industrial.
Methodist, 38 day, 4 boarding, and 4 industrial.
Presbyterian, 7 day and 8 boarding schools.
Salvation Army, 2 day schools.

There was in 1912 an enrolment of 7.399 in the day schools, 2.335 in the boarding schools, and 1,569 in the industrial schools, divided, as regards boys and girls, in almost exactly equal numbers. The day schools meet most of the necessary requirements, but the difficulty experienced is to secure the regular attendance of the children. The best means to this end has been found to be the conveyance of the children to the school and the provision of the midday meal, and these inducements are offered in many places. In the boarding schools the pupils are fed and clothed, and in addition to instruction in the ordinary branches of an English primary education, the boys receive instruction in gardening, the care of animals, primitive farming, and odd jobs. The industrial schools are also residential, but the technical education is more advanced and boys are trained in agriculture, carpentry, shoemaking, blacksmith's work, baking, &c. The industrial school graduates are generally helped by the Department of Indian Affairs, when they return to the reservation, by the gift of oxen and implements to a certain amount, and the granting of a loan to be repaid within a given time, the obligation being met with commendable promptness in a large number of cases. The percentage of cases in which the assistance has been wasted is extremely low.

Farm instructors, appointed by the government, superintend the agricultural operations, and these efforts to induce the Indians to follow agricultural pursuits are meeting with a fair measure of success. In 1912 they had under cultivation over 60,000 acres, with crops valued at $1,500,000. Their other principal occupations are hunting, trapping, and fishing, besides which some are engaged in various industries, and their earnings in 1912, including the amount mentioned for agriculture, reached the sum of $5,500,000.

The majority of criminal cases against Indians are due to their having been supplied with intoxicants, but when their number is considered, as well as the environments of many of them, the number of cases of serious crime is small.

Ethnological investigations: Nootka Indians.

As it had been felt by the Geological Survey Department of the Dominion Government that it was desirable to undertake a systematic investigation among the native tribes of Canada, for the purpose of gathering extensive and reliable information on their ethnology and linguistics, a beginning was made in the autumn of 1910 among the Nootka Indians of the west coast of Vancouver Island. The Nootka language was found to be one of considerable phonetic difficulty and complexity of structure. Inquiries were made into grammatical form, and mythological and ethnological texts were collected, these being considered valuable, not only as illustrating native speech in actual idiomatic use, but also from a strictly ethnological standpoint expressing the native point of view in matters of custom and belief. The most valuable of the texts are a long and detailed legend of the chief's family of the Ts'ishya'ath tribe, beginning with the creation of man and the Deluge and ending with the recent genealogy of the present chief, and an equally long origin myth of the wolf ritual or Tlokwana, the most important religious ceremony of the Nootka Indians.

Among the topics that were investigated were the native geography of Barkley Sound and Alberni Canal, personal names, inheritance of family privileges, secret rituals for the attainment of power in hunting and fishing, the wolf ritual, the doctoring ritual, and potlatches, and a set of 67 songs was taken down on the phonograph. It is believed that a satisfactory beginning has been made of a scientific study of the Nootka Indians, but several years' work will be necessary before anything like a complete account of them can be presented.

Iroquois and Algonkin.

Work was done in 1911 in the Iroquois and Algonkin reservations of Ontario and Quebec, special attention being directed to investigating the structure of the languages of the Mohawks and the Senecas. The great care taken in the matter of phonetic accuracy made it apparent that most, if not all, attempts at recording Iroquois had been notably lacking in that regard. Linguistic data on Delaware showed it to be a phonetically quite specialized Algonkin language, in pronunciation peculiarly lifeless and abounding not merely in voiceless final vowels, like several other Algonkin languages, but also in voiceless final syllables or groups of syllables. Linguistic material was also obtained from the Iroquois of Mohawk speech near Montreal, and at Rivière du Loup on Malecite, and at Lac St. Jean on both Montagnais and Cree. The investigator states his belief that Montagnais and Cree are dialects of one language, and asserts that this means that what is a single language, all the dialects of which are mutually intelligible, is spoken from the Gulf of St. Lawrence to west of the Yellowhead Pass in the Rocky Mountains.

Hurons.

In the same year (1911) ethnographic work on the Hurons or Wyandots of Lorette (Quebec), and Amherstburg (Ontario), furnished excellent data on their social status, social dynamics, and technology. Information was collected relating to the phratries, the clans, and a fraternity ; the hierarchy of the clans in the phratries, and of the individuals in the clans ; and, finally, the ancient villages. The existence of the phratries was revealed by a text recorded in Wyandot and by some survivals in connexion with the seed game. The text gives an explicit account of the origin, at a great council of prehistoric times, of the federation of all the clans but one into two mutually dependent phratries, respectively under the leadership of the Big Turtle and Deer clans. The eleven Huron clans, in order of precedence, are given as follows : the Moss Turtle (Big Turtle), the Speckled Turtle (or Small Turtle), the Prairie Turtle (or Terrapin), and the Beaver clans constituted the Big Turtle phratry ; while the Deer phratry consisted of the Deer, the Bear, the Porcupine, and the Hawk clans. These two phratries in the old tribal councils occupied the opposite sides of the council fire. The Wolf clan was a third unit, all by itself, standing at one end of the fire. Extensive accounts of the subsequent origin of the Snake and Snipe clans have brought an interesting contribution to the much disputed question as to how clans originate. The origin of the Snake clan—vividly described in a text, and in a series of songs recorded phonetically with translation as well as on the phonograph—is still clearly remembered by most of the old Oklahoma Wyandots. Briefly it runs as follows. At the end of her puberty seclusion a maiden was devoted to a mythical monster-snake by her relatives of the Deer clan, with a view to securing ‘ powers ’ and a new crest. Thereafter the relatives of the maiden, in collateral line, became the constituent members of the Snake clan, that has held annual feasts until about half a century ago to commemorate this event. The mode of origin of the Snipe clan among the Wyandots, the existence of which has probably not yet been recorded, is radically different, as about two centuries ago it was brought from outside into the Wyandot social system. A Seneca woman of the Snipe clan, having married a Wyandot, came to reside among the Wyandots. Owing to her not having been adopted into a Wyandot clan, as was the custom, she retained her own clan and transmitted it to her descendants. The Snipe clan, thereafter assimilated to the other Wyandot clans, has subsequently counted many members, the individual names of whom, framed according to the traditional rules of the Hurons, have been recorded. Three out of these eleven clans—the Prairie Turtle, the Hawk, and the Beaver clans—have been extinct for some length of time, and only a few representatives of the Snake and Snipe clans are still to be found.

The number of traditional individual clan-names collected in the course of the present study may exceed seven hundred; approximately a sixth of these could not be translated, as their meaning has been forgotten. A small proportion of the names that could be translated have been found to refer to the mythology of the clans, while the greater number allude either to various attributes of the clan totems or to a characteristic trait of some deceased ancestor.

The White Lion fraternity.

With regard to societies devoted to shamanistic and doctoring practices, the former existence of the White Lion fraternity has been demonstrated. The origin of the White Lion fraternity seems to have taken place two or three centuries ago, at the time when a number of Huron bands were dwelling in the vicinity of Lake Michigan. A text and a series of ritual songs, duly recorded, and other collateral information describe circumstantially how, in the course of fantastic events, many individuals belonging to three different clans evoked from an awful stream a monster-lion, to whom they surrendered a maiden with the definite purpose of getting his blood for magical operations. At the special command of the monster, annual or occasional feasts have been held until recent years, in the course of which songs and rituals were performed in conformity with the initial instructions.

Huron government.

The Hurons were governed by their tribal and clan councils, the jurisdiction of neither of which conflicted with the other, that of the tribal council being strictly confined to matters of general concern, and that of the clan to affairs of internal and local interest, as each clan had one or more villages of its own. The phratries, the function of which was essentially concerned with tribal government and marriage regulations, were the constituent elements of the tribal council; the clan councils, on the other hand, were mere aggregates of individuals. A consequence of this was that while, in the tribal council, each clan had but one vote, in the clan council the same right was extended to every individual, with the exception of those not of mature age. The function of the clan totems was not only connected with various traditional events and associated customs, but also with the graphic and symbolic representation, in the form of a communal crest or emblem, of the people of the clan. It is interesting to note that very little evidence to the same effect obtains regarding the phratry totems, the Big Turtle and the Deer.

Matrilinear inheritance of clan rights has been the rule down to the present day in Wyandotte (Okla.) and Anderdon (Ont.), and very few exceptions may be found. The advanced decadence of the Lorette Hurons having caused this rule, however, to fall into almost complete oblivion, the rigid outlines of the clans have long faded away; a result of which is that, while in Oklahoma very few violated the taboo prohibiting inter-clan marriage, no such taboo is known to the Lorette people. Many interesting customs and ceremonials have lingered almost to the present day in connexion with the ritual of conferring individual names on children or adults in conformity with the rules of matrilinear inheritance, and in connexion with the adoption of distant relatives or of strangers with a view to having them fill the vacant places of direct descendants and thus maintaining the integrity of the clans.

Micmacs. Work among the Micmac Indians, who are scattered in groups throughout the maritime provinces, was also done in 1911, and a careful study was made of the remaining folk-lore and mythology of the tribe. The most notable figure in their mythology and folk-lore is Glooscap (Kulóscap or Klûskâbe), a kind of culture-hero, who made man and became his friend, making, naming, and subduing the animals; he victoriously fought and destroyed giants and monsters, brought the summer to Canada, and finally, when the world became evil, went away to a happy island, sailing in his canoe and promising to come back some day.

Eskimos

Of Eskimos in Canada there are estimated to be 4,600, and, in conjunction with the American Museum of Natural History of New York, researches have been made among those who live in the Arctic Region between Mackenzie River and Hudson Bay. Three reports of an ethnological character have been received, respectively entitled 'Ethnological Report on the Eskimos of Coronation Gulf Region'; 'Distribution and Seasonal Migrations of the Copper Eskimos'; and 'Prehistoric and Present Commerce among the Arctic Coast Eskimo'.

At the Victoria Memorial Museum at Ottawa a collection is being formed of ethnological material which is being obtained by purchase and otherwise, and a set of lantern slides illustrating Canadian ethnology is in preparation as the beginning of a stock for lecture purposes.

General works of reference

[General works on the Dominion include W. L. Griffith, *The Dominion of Canada*, London, 1911; J. C. Hopkins, *Progress of Canada in the Nineteenth Century*, Toronto, 1902; and *Canada, an Encyclopaedia of the Country*, Toronto, 1898–1900; and reference may also be made to the handbooks prepared in connexion with visits of the British Association to Canada. An exhaustive bibliography for the period 1534–1906 will be found in N. E. Dionne, *Québec et la Nouvelle France*, Quebec, 1905–9, the fourth volume of which contains a list of maps, charts, &c., published in 1508–1908.]

CHAPTER IX

GOVERNMENT AND ADMINISTRATION

By W. L. Griffith

Development of representative government.

The first attempt to establish representative and legislative institutions in Canada was made in 1767, when George III issued a proclamation by which the people were given the right to elect representatives to an assembly, but it largely failed in its object because it required all persons holding office or elected to an assembly to take oaths against transubstantiation and the supremacy of the Pope, and, as the great majority of the inhabitants were of French extraction and belonged to the Roman Catholic faith, they refused to take the oath. Consequently, though relatively insignificant in numbers, the English element continued to hold the reins of power by means of the executive council and public offices. In 1774 the Parliament of Great Britain gave the first constitution to Canada by passing the Quebec Act, which went in the direction of conciliating the French Canadians, as it placed the Roman Catholic population on the same footing as the Protestants, allowed their church as a corporate body to retain its property, and restored French civil law in respect of property and individual rights, but, with the full approval of the French, the criminal law of England was retained. This Act established a legislative council nominated by the Crown, the project of the assembly being indefinitely postponed. A further and long step in the extension of popular government was brought about by the immigration of the United Empire Loyalists who settled in Nova Scotia, New Brunswick, and Ontario. The settlement of so large a number of English people multiplied difficulties which were constantly arising between the two races, and were increased by the fact that the two systems of law were frequently clashing, necessitating once more the interference of the British government. On this occasion two separate provinces were formed in which the two races could work out their own future, as far as practicable apart from each other, thus strengthening the French-Canadian position as a distinct nationality and perpetuating their religion and institutions.

Constitution of 1791 and later Acts

The Constitutional Act of 1791 extended the political liberties of the people in the two provinces of Upper Canada and Lower Canada—now Ontario and Quebec—organized under the Act, by giving them a complete legislature composed of a governor, a legislative council nominated by the Crown, and an assembly elected by the people on a restricted franchise. Various causes induced much political discontent during the following fifty years, becoming at one time so acute that in Lower Canada the constitution was at one period suspended for three years, 1838–40. The feeling which had arisen that the separation of the two races had been a political mistake then led to an effort towards a national amalgamation. The Act of 1840 reunited the provinces of Upper and Lower Canada under one government, but the French Canadians were displeased with the fact that in official documents and parliamentary proceedings the French language was no longer placed on the same footing as English, and they suffered under a sense of injustice that Upper Canada was given the same representation as Lower Canada in the assembly, notwithstanding the larger population of the latter at that time. The first-mentioned grievance was soon remedied by an amendment of the Act, and the clause providing for equality of representation proved a security when the Upper province increased more largely in population than the French-Canadian section. This Act gave the Canadian legislators full control of taxation, supply, and expenditure, in accordance with English constitutional principles, and these conditions existed until 1867. Up to this time the provinces of New Brunswick, Nova Scotia, and Prince Edward Island had not been given written constitutions by the Parliament of Great Britain, but to all intents and purposes they had enjoyed as complete a system of self-government as Upper and Lower Canada, and had not suffered from the complications which had arisen there from the differences between two races of people, although each had troubles of its own of another kind. Their constitutions are to be found in the commissions of the lieutenant-governors, dispatches of the colonial secretaries, imperial statutes, and other official documents.

Union of 1867.

Some years before 1867 statesmen came to see that if real progress was to be made a union of all the provinces was necessary. As things were, each had its own government, its own laws, its own parliamentary system, and each in its way was developing along lines of policy dictated by purely local considerations ; each, too, had a tariff designed to keep out its neighbours' produce. In these circumstances, a movement was set on foot advocating the union of all the provinces, and in the autumn of 1864 a representative meeting of men of all shades of political opinion was held to consider the carrying out of such a measure. Eventually a set of resolutions was agreed upon and then adopted by the various legislatures, embodying the conditions on which the provinces would agree to a federal union. Presented to the Crown in the shape of addresses, they resulted in the British North America Act, 1867, which framed the present constitution of the Dominion of Canada. British Columbia had occupied a detached position. In 1849 Vancouver was constituted a Crown colony, and in 1858 what was formerly called New Caledonia was created a second Crown colony under the name of British Columbia, and included all that is now known as British Columbia, excepting Vancouver Island. The latter had a legislative assembly, but it could not remove its executive officials, and of the legislative council which was organized in British Columbia in 1863, only three of its thirteen members were elected by the people, five being government officials and the other five magistrates appointed by the government. This brief sketch of the events preceding

confederation may make plain provisions in the Act which might be otherwise unintelligible.

Constitution of the Dominion.

By the British North America Act, 1867, it was declared that the provinces of Canada (Upper and Lower), Nova Scotia, and New Brunswick shall form and be one Dominion under the name of Canada: that it shall be divided into four provinces named Ontario, Quebec, Nova Scotia, and New Brunswick, the provinces of Upper and Lower Canada to be two separate provinces, Upper Canada constituting the province of Ontario and Lower Canada constituting the province of Quebec. A general census of the population was required to be taken in 1871 and in every tenth year thereafter. Under the heading of 'Executive Power' it is enacted that the executive government of and over Canada shall be vested in the reigning Sovereign (at that time Queen Victoria); that there shall be a governor-general to act on behalf of the Sovereign: that he may be authorized to appoint deputies: that, to aid and advise the government, there shall be a privy council for Canada, the members of which shall be chosen and summoned by the governor-general and may be removed by him. The command-in-chief of the naval and military forces is declared to be vested in the Sovereign, and, until otherwise directed, the seat of government is to be Ottawa.

Parliament.

Under the head of 'Legislative Power' the Act provides that there shall be one parliament, consisting of the Sovereign, an upper house styled the Senate, and the House of Commons: the privileges, immunities, and powers of the Senate and of the House of Commons are declared to be such as may be enacted by an Act of the parliament at any time, providing that they never exceed those which, at the passing of the British North America Act, were possessed by the House of Commons of the United Kingdom. It is also enacted that there must be a session of the parliament of Canada once at least in every year. The composition and regulations prescribed in the Act in regard to the Senate and the House of Commons are dealt with under the heading of 'Parliament'.

Under the head of ‘ Money Votes ’, it is enacted that Bills for appropriating any part of the public revenue shall originate in the House of Commons, and it must be for a purpose first recommended to the house by message of the governor-general in the session in which the Bill, vote, resolution, or address is proposed. Bills passed by both houses must be presented to the governor-general for the Sovereign’s assent, and he may declare that he assents in the Sovereign’s name, that he withholds the assent, or that the Bill is reserved for the signification of the Sovereign’s pleasure. In the latter case the Bill does not come into force for two years unless the governor-general signifies in the meantime that it has received the assent of the Sovereign in Council.

Under the heading of ‘ Provincial Constitutions, Executive Power ’, provision is made for a lieutenant-governor for each province to be appointed by the governor-general, the appointment to run for five years, except for reason assigned, and the salaries to be fixed and provided by the parliament of Canada.

Distribution of legislative powers: (*a*) Dominion Government.

Dealing with the distribution of legislative powers, the Act declares that the parliament of Canada shall legislate in connexion with all matters not coming within the classes of subjects assigned exclusively to the provincial legislatures, but further declares that the exclusive legislative authority of the parliament of Canada extends to all matters coming within the following classes of subjects :

1. The public debt and property.
2. The regulation of trade and commerce.
3. The raising of money by any mode or system of taxation.
4. The borrowing of money on the public credit.
5. Postal service.
6. The census and statistics.
7. Militia, military, and naval service, and defence.
8. The fixing of, and providing for, the salaries and allowances of civil and other officers of the government of Canada.
9. Beacons, buoys, lighthouses, and Sable Island.
10. Navigation and shipping.
11. Quarantine, and the establishment and maintenance of marine hospitals.

12. Sea-coast and inland fisheries.
13. Ferries between a province and any British or foreign country, or between two provinces.
14. Currency and coinage.
15. Banking, and the incorporation of banks and paper money.
16. Savings banks.
17. Weights and measures.
18. Bills of exchange and promissory notes.
19. Interest.
20. Legal tender.
21. Bankruptcy and insolvency.
22. Patents of invention and discovery.
23. Copyrights.
24. Indians, and land reserved for the Indians.
25. Naturalization and aliens.
26. Marriage and divorce.
27. The criminal law, except the constitution of the courts of criminal jurisdiction, but including the procedure in criminal matters.
28. The establishment, maintenance, and management of penitentiaries.
29. Such classes of subjects as are expressly excepted in the enumeration of the classes of subject by this Act assigned exclusively to the legislatures of the provinces.

(*b*) Provincial governments.

None of these is to be deemed as coming within the class of matters of a local or private nature comprised in the following enumeration of classes of subjects assigned exclusively to the legislatures of the provinces:

1. The amendment from time to time, notwithstanding anything in this Act, of the constitution of the province, except as regards the office of the lieutenant-governor.
2. Direct taxation within the province for the raising of a revenue for provincial purposes.
3. The borrowing of money on the sole credit of the province.
4. The establishment and tenure of provincial offices, and the appointment of provincial officials.
5. The management and sale of the public lands belonging to the province, and of the timber and wood thereon.
6. The establishment, maintenance, and management of public and reformatory prisons in and for the province.
7. The establishment, maintenance, and management of hospitals, asylums, charities, and eleemosynary institutions in and for the province, other than marine hospitals.
8. Municipal institutions in the province.
9. Shop, saloon, tavern, auctioneer, and other licences, for

the raising of a revenue for provincial, local, or municipal purposes.

10. Local works and undertakings, other than such as are of the following classes :

(*a*) Lines of steam or other ships, railways, canals, telegraphs, and other works and undertakings, connecting the province with any other or others of the provinces, or extending beyond the limits of the province.

(*b*) Lines of steamships between the province and any British or foreign country.

(*c*) Such works as, although wholly situated within the province, are before or after their execution declared by the parliament of Canada to be for the general advantage of Canada or for the advantage of two or more of the provinces.

11. The incorporation of companies with provincial objects.

12. Solemnization of marriage in the province.

13. Property and civil rights in the province.

14. The administration of justice in the province, including the constitution, maintenance, and organization of provincial courts both of civil and criminal jurisdiction, and including procedure in civil matters in those courts.

15. The imposition of punishment by fine, penalty, or imprisonment, for enforcing any law of the province made in relation to any matter coming within any of the classes of subjects enumerated in this section.

16. Generally, all matters of a merely local or private nature in the province.

Education, legislation, &c.

Each provincial legislature may exclusively make laws in relation to education, subject to the following provisions : (1) That nothing in such law shall prejudicially affect any right or privilege with respect to denominational schools existing at the time of the union ; (2) all the powers, privileges, and duties at the union by law conferred and imposed in Upper Canada on the separate schools and school trustees of Roman Catholics are extended to the dissentient schools of both Protestants and Roman Catholics in Quebec ; (3) where in any province a system of separate or dissentient schools exists by law at the union or is thereafter established by the provincial legislature, an appeal shall lie to the governor-general in council from any act of any provincial authority affecting any right or privilege of the Protestant or Roman Catholic minority ; (4) if the provincial legislature fails to carry out these provisions, the parliament of Canada may make remedial laws.

The parliament of Canada may make provision for the uniformity of laws relative to property and civil rights in Ontario, Nova Scotia, and New Brunswick, but such an Act does not have any effect in any province until it is adopted by the legislature.

Each province may make laws in regard to agriculture and to immigration, but the parliament of Canada may also make laws in regard to the same subjects, and the provincial law only has effect as long and as far as it is not repugnant to any Act of the parliament of Canada.

Judicature.

The chapter in the Act dealing with the judicature provides that the governor-general shall appoint the judges of the superior district and county courts in each province, except those in the courts of probate in Nova Scotia and New Brunswick; that until the laws relative to property and civil rights and the procedure of the courts in Ontario, Nova Scotia, and New Brunswick are made uniform, the judges of the courts in those provinces shall be selected from the respective bars of those provinces; that the judges of the courts of Quebec shall be selected from the bar of that province; that the judges of the superior courts may only be removed on address by the Houses of Parliament, and that the salaries, allowances, and pensions of the judges (except the courts of probate in Nova Scotia and New Brunswick) shall be fixed and provided by the parliament of Canada. Further, the parliament of Canada may establish a general court of appeal and any additional courts.

Financial provisions.

The Act transferred from the provincial legislatures all duties and revenues, except such as are reserved or are raised in accordance with special powers by the Act, to a consolidated revenue fund to be appropriated for the public service of Canada, and after making provision for expenses of collecting interest on provincial public debts, the salary of the governor-general (£10,000), and the transfer of stocks and other property, it is declared that the provinces shall retain the ownership of all lands, mines, minerals, and royalties belonging to them at the time of the union. Several clauses deal with the adjustment of the various provincial debts, and are followed by one which provides for the following annual payments by Canada to the several provinces for the support of their governments and legislatures: Ontario $80,000, Quebec $70,000, Nova Scotia $60,000, New Brunswick $50,000. An annual grant in aid of each province is to be made equal to 80 cents per head of the population as ascertained by the census of 1861, and in the case of Nova Scotia and New Brunswick by each subsequent decennial census until the population of each of those two provinces amounts to 400,000, at which rate the annual grant thereafter is to remain. The grants are subject to the deduction of all sums chargeable as interest on the public debt of the provinces in excess of the several amounts stipulated in the Act. There was a further grant to New Brunswick for a period of ten years.

Provincial excise laws, &c.

It was enacted that all articles of the growth, produce, or manufacture of any one of the provinces should, from and after the union, be admitted free into each of the other provinces, but provision was made for the continuance of provincial customs and excise laws until altered by the parliament of Canada. Duties and revenues possessed by the various provinces before the union, reserved to the respective governments or legislatures by the Act, or raised in accordance with the special powers conferred by the Act, were in each province to be formed into one consolidated revenue fund to be appropriated for the public service of the province, and no lands or property belonging to Canada or any province were to be liable to taxation.

General provisions.

The general clauses provide for the continuance of all courts, legal commissions, &c., existing at the union, until repealed, abolished, or altered by the parliament of Canada, and for the use of either the English or French language in the debates of the houses of the parliament of Canada and the houses of the legislature of Quebec, both languages to be used in the respective records and journals of those houses, all Acts of parliament and of the legislature of Quebec to be printed and published in both languages, and either language to be used by any person or in any pleading or process from any court of Canada established under the Act in any of the courts of Quebec.

A joint declaration having been made by the provinces that the construction of the intercolonial railway was essential to the consolidation of the union, it was made an obligation on the parliament of Canada to connect the River St. Lawrence by rail to the city of Halifax, Nova Scotia.

Finally, provision was made to admit to the union, should they desire it, Newfoundland, Prince Edward Island, and British Columbia, and also Rupert's Land and the North-West Territories.

The parliamentary powers in connexion with the establishment of provinces were more clearly defined in the British North America Act, 1871, and power was given to legislate for any territory not included in a province, and an Act of 1886 made provision for the representation in parliament of such territories. The Manitoba Act, 1870, provided for the formation and representation of that province; British Columbia was admitted to the union by Order in Council dated May 16, 1871; Prince Edward Island by Order in Council dated June 26, 1873; the Alberta Act, 1905, and the Saskatchewan Act, 1905, established those provinces and provided for their government.

General principles of Canadian government.

From the foregoing will be seen the leading principles on which the Canadian system of government rests, namely, a federation with a central government exercising general powers over all the members of the union, and a number of local governments having the control and management of certain matters naturally and conveniently falling within their defined jurisdiction, while each government is administered in accordance with the British system of parliamentary institutions. These are the principles embodied in the resolutions of the Quebec Conference of 1864, which agreed that the system of government best adapted under existing circumstances to protect the diversified interests of the several provinces and secure harmony and permanency in the working of the union would be a general government charged with matters of common interest to the whole country, and local governments for each of the provinces charged with the control of local matters in their respective sections, and desiring to follow the model of the British constitution so far as circumstances would permit, with the executive authority or government vested in the Sovereign of the United Kingdom of Great Britain and Ireland. With this constitutional law, however, there were adopted the practices which can only be found in the usages and conventions that have originated in the general operation of the British constitution. Professor Dicey in one of his works showed clearly that constitutional law, as it is understood in England and in Canada, consists of two elements; the one he calls the 'law of the constitution' is a body of undoubted law; the other he names the 'conventions of the constitution' consisting of maxims or practices which, though they regulate the ordinary conduct of the Crown and of ministers and of others under the constitution, are not in strictness law at all. Thus if it is necessary to ascertain whether a certain power belongs to the Dominion or to a provincial government, reference is made to the written constitution, the British North America Act; but if the question is the nature of the relations between the governor-general and his advisers, the conventions and usages of parliamentary or responsible government must be studied. There is therefore not only a written constitution, to be interpreted whenever necessary by the courts, but a mass of English precedents and authoritative maxims which form an unwritten law having as much force practically in the operation of the political system as any legal enactment on the statute book.

The British North America Act can only be amended in its material and vital provisions by the Imperial Parliament. The Act gives power to the Canadian legislature itself to make amendments in certain domestic matters which do not affect the fundamental principles of the constitution, but those provisions which constitute the executive authority of the Dominion, regulate the terms of union, and define the limits of the jurisdiction of the several governments, cannot be altered except by the Imperial Parliament.

The power to make treaties with foreign countries has not been conferred upon the Dominion, as a dependency cannot of her own action enter into a treaty arrangement with a Sovereign nation, but in practice, when a question of Canadian policy is in consideration, the King in Council gives the necessary authority to Canadian representatives, any resulting treaty when passed by the Canadian parliament being submitted for approval to the Imperial Parliament. In Canada the governor-general has the right of veto, similarly to the power held in Great Britain by the Sovereign, but it is just as seldom used in one case as the other: the governor-general, however, has also the power to reserve bills for the consideration of the Imperial government, and they may be disallowed within two years if they are found to conflict with imperial interests and are beyond the legitimate powers of Canada as a dependency. The cases where a bill is disallowed are exceedingly rare, and, within the limits of its constitutional jurisdiction, the Dominion parliament enjoys an authority as ample as that possessed by the Imperial Parliament, practically wielding sovereign rights within the limit of her territory.

Parliament.

It has already been said that the British North America Act provided that the government should be carried on by a representative of the Sovereign, an upper house styled the Senate, and a House of Commons, and that there must be a session of the parliament once at least in every year.

The Senate.

Under the Act of 1867 the Senate consisted of 72 members—24 for Ontario, 24 for Quebec, 12 for New Brunswick, and 12 for Nova Scotia—the two last named being designated the Maritime Provinces: but power was given to add 3 or 6 members representing equally Ontario, Quebec, and the Maritime Provinces. In case any such addition is made, the governor-general must not summon any new member, except by direction of the Sovereign, until each of the 3 divisions is again represented by no more than its normal number of 24. The inclusion of Prince Edward Island carried with it a representation of 4 senators, but the Act had previously provided that if Prince Edward Island join the union, New Brunswick and Nova Scotia should each lose two senators, so that the representation of the Maritime Provinces still remains at 24.

Increases in the number originally fixed were authorized by various Acts, and on British Columbia joining the union, 3 more were added ; and when the provinces of Manitoba, Saskatchewan, and Alberta were formed, there was a further addition of 4 in each case, making a total of 87. Parliament, however, had power to increase the representation of Alberta and Saskatchewan to 6 each after the completion of the census taken in 1911.

Senators are nominated by the Crown, which practically means by the government of the day ; they must each be of the full age of 30 years, natural-born or naturalized subjects resident in the province for which they are appointed, and must have real and personal property worth $4,000 over and above all debts and liabilities. In the case of Quebec a senator must have his real property qualification in the electoral division for which he is appointed, or be resident therein. Senators hold their seats for life subject to the provisions of the Act, but they may resign. A senator's seat becomes vacant, however, if he is absent for two consecutive sessions, if he becomes a bankrupt or insolvent, if he is attainted of treason, or convicted of any infamous crime, or if he ceases to be qualified in respect of property or residence. Any question respecting the qualification of a senator must be heard and determined by the members of the Senate themselves.

Fifteen members, including the Speaker, who is appointed by the governor-general in council, form a quorum, and questions are decided by a majority, the Speaker in all cases having a vote; when the votes are equal the decision is deemed to be in the negative. As in the British House of Lords, the Senate possesses power to introduce bills other than money bills and measures imposing taxes or those involving the spending of public money received from the people.

House of Commons

The House of Commons originally consisted of 181 members, but there are now 221, Ontario being represented by 86, Quebec by 65, Nova Scotia 18, New Brunswick 13, Manitoba 10, Saskatchewan 10, British Columbia 7, Alberta 7, Prince Edward Island 4, and the Yukon Territory by 1.

In providing for the increase or readjustment of representation, the British North America Act, 1867, made Quebec the basis on which the numbers should be fixed. The members from Quebec remain at 65, and the members assigned to each of the other provinces bear the same proportion to the number of its population as the number 65 bears to the number of the population of Quebec. In the computation a fractional part not exceeding one-half of the whole number requisite for entitling the province to a member is disregarded, and, on the other hand, a fractional part exceeding the half is looked upon as a whole number. The readjustment takes place after each decennial census, but a reduction is not arranged for in the Redistribution Act which is subsequently passed unless the proportion which the number of the population of the province bore to the number of the aggregate population of Canada at the previous readjustment is diminished by one-twentieth part or upwards, and no readjustment takes effect until the termination of the then existing parliament. The results of the census of 1911 indicated a considerable gain in representation from the provinces in the west, Manitoba, Saskatchewan, Alberta, and British Columbia, at the expense of Ontario, New Brunswick, Nova Scotia, and Prince Edward Island.

Parliament has power to increase the number of members of the House of Commons, provided the proportionate representation of the provinces is not disturbed, the population per member in Quebec being the basis for the representation of the other provinces. Membership of the House of Commons is not dependent upon any property qualification, it being necessary only that he should be a British subject by birth or naturalization; nor need he reside in the district for which he is elected, but a senator may not be elected, or sit or vote in the House of Commons. Insanity, bankruptcy, or conviction of a felony, carry with them expulsion from the house.

The Speaker is elected by the members of the House of Commons from among their own number, and he presides at all meetings of the house (provision being made for temporary absence). Contrary to the practice in the Senate, the Speaker of the House of Commons does not vote except when the other votes are equally divided. Twenty members, counting the Speaker, form a quorum.

Payment of members.

The Speakers of the Senate and of the House of Commons respectively each get a salary of $4,000 per annum. Each member of the Senate and of the House of Commons receives an indemnity of $2,500 for each session which extends beyond 30 days: for a session of fewer than 31 days the allowance is $20 per day. A deduction of $15 per day is made for every day beyond 15 on which the member does not attend a sitting of the house of which he is a member, allowance being made for illness or absence on military duty. Travelling expenses are also paid for one journey each way between the member's place of residence and Ottawa, and to the member occupying the recognized position of Leader of the Opposition in the House of Commons there is paid an additional sessional allowance of $7,000.

Qualifications.

Except for the disqualifications which follow, any British subject may be a candidate for a seat in the House of Commons, no qualifications in real estate being required. The disqualifications are—conviction of corrupt practices at an election, being directly or indirectly interested in a government contract, being a member of a provincial legislature, holding office as sheriff, registrar of deeds, clerk of the peace, county Crown attorney, or being an employee of the government, the latter classification not including ministers of the Crown. The election of any person declared ineligible is void, but in the case of any member of a provincial legislature receiving a majority of votes, notwithstanding his disqualification, the person having the next largest number of votes is declared elected.

Departments of Dominion government.

When the governor-general appoints a body of advisers to assist him in the government he calls them to be members of the privy council and to hold certain offices of state, and to become heads of certain departments whose functions are regulated by statute. The departments are as follows: justice, finance, agriculture, secretary of state, external affairs, marine and fisheries, naval service, militia and defence, inland revenue, interior, post office, public works, trade and commerce, customs, labour, and railways and canals. There may also be some members of the government without portfolio. Privy councillors when not in the government retain their honorary rank, but it has no official responsibility or meaning and merely entitles them to certain precedence on state occasions.

Ministers.

The minister of justice is by virtue of his office attorney-general and is entrusted with practically the same powers and charged with the same duties which belong to the office of attorney-general in England, so far as these are applicable to Canada. The minister of finance has the supervision and control of all matters connected with financial affairs and public accounts, and he is receiver-general, to whose credit all public moneys must be paid. The duties of the minister of agriculture relate to the administration of matters connected with agriculture, public health and quarantine, arts, patents, copyright, &c., but an intention has been expressed to transfer some of these to other departments. The duties of the secretary of state include the keeping of the state correspondence and of the state records and papers, and the minister in charge of the department is registrar-general. In 1909 the Department of External Affairs was created by statute, to have the conduct of all official communications between the government of Canada and the government of any other country in connexion with the external affairs of the Dominion, and all matters relating to the foreign consular service in Canada. The minister of marine and fisheries has control, among other charges, of matters relating to pilots, the construction and maintenance of lighthouses, piers, wharves, steamboat inspection, the registering and measurement of shipping, hydrographic surveys, deck and load lines, and the regulation of sea-coast and inland fisheries. He is also minister of the naval service, a department recently formed, and as such has the management of all naval affairs, including the construction, purchase, &c., of naval establishments, and of ships and other vessels. The fisheries protection service is also under his control. The minister of militia and defence is charged with and is responsible for the administration of militia affairs, and of the fortifications, ordnance, arms, armouries, stores, &c., belonging to Canada. The department of customs is under a minister, but the commissioner of customs is appointed by the governor-general. The department has control and management of the collection of customs duties and of matters incident thereto. The department of the minister of inland revenue has the control and management of the collection of stamp duties, and the preparation and issue of stamps and stamp paper, except postage stamps, of internal taxes, standard weights and measures, and the collection of bridge and ferry tolls and rents. The minister of the interior has the management of affairs in connexion with Crown lands and all other public lands not specially under the control of other departments, immigration and Indian affairs. The postmaster-general may, subject to the acts in force, establish or close post offices, appoint or suspend postmasters, make mail contracts and promulgate regulations in regard to postal matters and the money-order system, grant licences for the sale of stamps, &c. The minister of public works has the management, charge, and direction of dams, construction and repair of harbours, piers, and works for improving navigation ; of slides, dams, and other works used for the transmission of timber and the collection of fees incident thereto, roads and bridges, public buildings and telegraph lines ; the maintenance and repair of government buildings and all other property belonging to Canada, or for the acquisition, construction, or alteration of which any public money is voted or appropriated by parliament, except works for which money has been appropriated as a subsidy only. The duties and powers of the minister of trade and commerce extend to the execution of the laws and Orders in Council relating to such matters connected with trade and commerce generally as are not by law assigned to any other department ; also to the Cullers Act, the Inspection and Sale Act (with the exception of certain parts), the Manitoba Grain Act, and the census. The minister of labour is charged with the administration of the Conciliation and Labour Act and the Industrial Disputes Investigation Act, 1907, and with such other duties as may be assigned to him by the governor in council. The minister of railways and canals has charge of all matters in connexion with railways throughout the Dominion and all the canals are under his direction and superintendence.

The cabinet.

As the cabinet depends for its existence upon the approval of the House of Commons, most of the ministers are drawn from it, the Senate never contributing more than four members. Every minister has the right to communicate with the governor-general on departmental matters, but on general matters the premier is the medium of communication. The cabinet, as in England, is bound by certain conventions, not to be found in the written constitution, but established by parliamentary usage. On the death or resignation of the premier, the cabinet is dissolved and ministers hold office only until a new premier is called. In the case of an adverse vote in the Lower House, the premier either resigns or must convince the governor-general that a dissolution is necessary on the ground that the adverse vote does not represent the wishes of the people. Proclamations resuming or dissolving parliament, writs of election, &c., are signed by the governor-general and countersigned by the minister or other proper officer.

Provincial legislatures.

Of provincial legislatures there are nine, belonging respectively to Nova Scotia, New Brunswick, Prince Edward Island, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, and British Columbia, and each has considerable powers of local government conferred by the British North America Act. Their work in each case is carried on by a lieutenant-governor, appointed by the governor-general in council, whose term of office is five years, though he can be removed for reason assigned. The lieutenant-governors are paid by the Dominion parliament. In addition to the lieutenant-governor, there is an advisory council composed of the ministers and responsible to the legislature, which consists of elected members. In the provinces of Quebec and Nova Scotia respectively there are two houses, the Legislative Assembly and the Legislative Council. The position of the latter is similar to that of the Senate, the members being appointed by the lieutenant-governor in council (practically by the government of the day), and holding their positions for life unless they are convicted of crime, become bankrupt, or are otherwise disqualified by law. There are 24 members in the Quebec council and 20 in that of Nova Scotia. They can initiate or amend all classes of Bills except money Bills or those dealing with taxation, but these they can reject.

Dominion payments to provinces.

The British North America Act made provision, as has been stated, for annual payments by the Dominion to the provinces for their governments and legislatures. In the case of Ontario this was $80,000, Quebec $70,000, Nova Scotia $60,000, New Brunswick $50,000, and to each in addition an annual grant of 80 cents per head of the population as ascertained at the census of 1861, and in the case of Nova Scotia and New Brunswick at each subsequent decennial census until the population reached 400,000 in each case, at which rate the grant was to remain. When other provinces were admitted or formed, similar provisions were made, and under them Manitoba receives $30,000, British Columbia $35,000, and Prince Edward Island $30,000 per annum, and 80 cents per head of population up to 400,000. Alberta and Saskatchewan each receive $50,000 per annum, and an annual grant of 80 cents per head on a population of 250,000 as a minimum up to 800,000 as a maximum. Various other payments have been provided for from time to time for considerations peculiar to each province, large sums being payable to Alberta and Saskatchewan as compensation for the Dominion taking over the land.

Payment of provincial members.

A sessional indemnity is paid by each province to its members. In Ontario the allowance is $10 a day if the session does not extend beyond 30 days, and if that length of time is exceeded, each member gets such an amount as may be appropriated for the purpose. In Quebec for each session which extends beyond 30 days the allowance is $1,500, in Manitoba the allowance is fixed at $400 per session, in British Columbia at $600, Alberta $1,500, Saskatchewan $1,500, Nova Scotia $700, New Brunswick $500, and Prince Edward Island $200.

Dominion and provincial governments: concurrent powers.

The powers vested in the provincial governments have been already enumerated, and all those powers not within the defined jurisdiction of the provincial governments are reserved in general terms to the central authority. It was the object of the framers of the constitution to leave to the old provinces as many of those powers and privileges that they exercised before the confederation as are necessary to the efficient working of a local government, and at the same time to give the central power effective control over all matters which afford unity and permanency to the whole federal organization, of which the provincial entities form political parts or divisions. The Dominion and local governments, however, also exercise certain rights in common, among them being concurrent powers of legislation in regard to agriculture and immigration. The Dominion parliament may make laws on these subjects for the country as a whole, while each legislature may do so for the province over which it has jurisdiction, provided no provincial Act is repugnant to any Dominion Act. A study of the two sections of the British North America Act will show that there are certain other subjects which may fall partly within the province of both. For instance, the Dominion government under the general provision giving it jurisdiction over ‘ the regulation of trade and commerce ’ has legislated fully in the matter of insurance, and the provincial legislatures have acted under the very wide right to incorporate companies ‘ with provincial objects ’. The question of jurisdiction was decided by the courts of Canada and affirmed by the privy council, and the principles laid down have served to prevent conflict of authority on other subjects. It was held that the local body may legislate in regard to insurance companies desiring to transact business within provincial limits. On the other hand, if the company wishes to carry on operations outside of the province it comes under the provisions of the federal law. The authority given to the Dominion parliament to legislate for the regulation of trade and commerce does not include the power to regulate by legislation the contracts of a particular business or trade in a single province. Therefore while power may be given to contract for insurance against loss or damage by fire, the form of the contract and the rights of the parties thereunder depend upon the laws of the province in which the business is done.

Criminal law.

The criminal law affords another example of jurisdiction by both federal and provincial authorities. The Dominion parliament has exclusive jurisdiction over the criminal law, but the local legislatures necessarily have it within their power, as provided for in the Act, to impose punishment by fine or imprisonment, to enforce any law of the province within its legislative authority. Many instances of conflict in regard to jurisdiction might be cited which have been carried to the courts of Canada and the privy council, but the principle of the settlement in each case has been that each legislative body should act within the legitimate sphere of its clearly defined powers, and the Dominion parliament should no more extend the limits of its jurisdiction, by the generality of the application of its law, than a local legislature should extend its jurisdiction by localizing the application of its statutes.

Limitations of Dominion and provincial legislation.

As on the one hand the federal parliament cannot extend its own jurisdiction by a territorial extension of its laws, and legislate on subjects constitutionally provincial, by enacting them for the whole Dominion; so, on the other hand, a provincial legislature cannot extend its jurisdiction over matters constitutionally federal, by a territorial limitation of its laws, and legislate on matters left to the federal power, by enacting them for the province only, such as, for instance, the incorporation of a bank for the province.

Dominion control over provincial legislation.

In one most important respect the Dominion government exercises a direct control over the legislation of each province: it can disallow, within one year of its receipt, any Act of a provincial legislature which is at variance with the interests of the Dominion. This illustrates the fact that the Dominion government now holds the position towards the provincial governments that England held before the confederation.

The Yukon Territory is governed by a commissioner and a territorial council, the latter elected for three years.

The affairs of the North-West Territories are controlled from Ottawa through a commissioner.

The franchise.

There is not a uniform franchise for Dominion elections, common to the whole of the country; the qualifications for a vote, except where otherwise provided, are those established by the laws of each province to govern elections for the provincial legislature. These laws differ in certain details. They all agree in confining the vote to British subjects, either born or naturalized, of the male sex and of the age of 21 years, and each provides for certain disqualifications, such as holding the office of judge, being a lunatic or prisoner, or having been convicted of corrupt practices at elections.

Ontario, Manitoba, Saskatchewan, Alberta, B.C.

In Ontario a voter must have resided in Canada for the nine months preceding the day for preparing the list on which he is to be entered, and he must be a resident of and be domiciled in the district for which the list is being prepared. In Manitoba an elector must have resided in the province for one year, and three months in the electoral division. Indians or persons of Indian blood receiving an annuity or treaty money from the Crown, or who have received an annuity or treaty money within three years, are disqualified ; and for persons not British subjects by birth, who have not resided in Canada for seven years, there is an educational test in English, German, Icelandic, or any Scandinavian language. In Saskatchewan and Alberta the time is twelve months in the province and three months in the district, and the disqualifications extend to Chinese and Indians in the former province and to Indians in the latter. In British Columbia, one must have been six months in Canada and one month in the particular district ; there is an educational test, and Indians and Asiatics are excluded.

Quebec.

In Quebec, it is provided that the following persons, and no others, being males, of the full age of 21 years at the time of the deposit of the list, subjects of His Majesty by birth or naturalization, and not otherwise legally disqualified, shall be entered on the list of electors :

1. Owners or occupants of immovable property valued at a sum of at least three hundred dollars in real value in any city municipality entitled to return one or more members to the legislative assembly, or two hundred dollars in real value or twenty dollars in annual value in any other municipality.
2. Tenants paying an annual rent for immovable property of at least thirty dollars in any city municipality entitled to return one or more members to the legislative assembly, or at least twenty dollars in any other municipality, provided that the real value of such immovable property be at least three hundred dollars in such city municipality or two hundred dollars in any other municipality.

3. Teachers engaged in an institution under the control of school commissioners or trustees.

4. Retired farmers or proprietors, commonly known as *rentiers* (annuitants), who, in virtue of a deed of gift, sale or otherwise, receive a rent in money or kind of a value of at least one hundred dollars, including lodging and other things appreciable in money.

5. Farmers' sons who have been working for at least one year on their father's farm, if such farm is of sufficient value, if divided between the father and sons as co-proprietors, to qualify them as electors under this chapter, or who have been working on their mother's farm for the same time. If there are more sons than one they shall all be entered in so far as the value of the property permits, the eldest being entered first. These provisions equally apply in cases in which the father or the mother have farms in several municipalities.

6. Proprietors' sons residing with their father or mother, subject to the conditions set forth in paragraph 5, *mutatis mutandis*.

7. Navigators and fishermen residing in the electoral district, and owners or occupants of real property, and owners of boats, nets, fishing gear and tackle, within any such electoral district, or of a share or shares in a registered ship, which together are of the actual value of at least $150.

8. Farmers' sons shall exercise the above rights, even if the father or mother is only tenant or occupant of the farm.

9. Temporary absence from the farm or establishment of his father or mother, during six months of the year in all, or absence as a 'student', shall not deprive the son of the exercise of the electoral franchise.

10. Priests, rectors, vicaires, missionaries, and ministers of any religious denomination, domiciled for upwards of two months in the place for which the list is made.

11. Persons who are domiciled in the electoral district and who draw from their salary or wages, in money or in kind, or from business, employment, trade or profession, a revenue of at least $300 per annum, or persons who work by the piece in factories and who derive at least $300 per annum therefrom.

Other provinces.

New Brunswick has manhood suffrage. Every male of the age of 21 years and a British subject who has been resident in the province for twelve months, is entitled to vote, if he is not in some way legally incapacitated. In Nova Scotia there are property, tenancy, and income qualifications. Prince Edward Island qualifies property owners and tax-payers.

Elections.

Except in the remote districts, elections are all held on the same day, the seventh after nomination day, and the method of voting is practically the same as that in England. The laws for the prevention of bribery and corruption are very strict and any infraction provides a case for the unseating of the member. If a candidate is proved to be personally guilty of bribery or corruption he may be disqualified from sitting in the House of Commons, or voting or holding any office for seven years.

Municipal government.

Each province legislates for the government of its own municipalities, and in every case general powers are taken for the election of mayors, aldermen, &c., and for the general conduct of affairs as in England, but in certain particulars they differ from each other and have a wider scope than in the United Kingdom.

British Columbia.

In British Columbia, councils may provide for the payment of an indemnity to each alderman, reeve, or councillor. They may grant aid by way of bonus for the promotion of waterworks, electric or other lighting systems, or other industries established within the municipal limits, or grant exemption from taxation for a period not exceeding 10 years, and they have other powers in the direction of guaranteeing debentures of industries, giving aid to railways, &c. They can purchase or construct water or other works, and acquire tramways, or electric light plant; raise municipal revenue by licence, taxes, or rates upon persons, upon real property, or upon improvements; have power to grant aid for hospitals, agricultural societies, charitable institutions, &c. Churches, cemeteries, hospitals, orphanages, and property vested in or held by His Majesty are exempt from taxation.

Every male between the ages of 21 and 60 years of age, residing in any township of district municipality for at least 30 days, is liable to perform statute labour for 2 days in the year on the roads or highways in the municipality, which, however, may be commuted by a payment of not more than 2 dollars per day. The council has power to issue what are known as 'trade licences', and to make charges for the same; these include licences for the sale of liquor; on merchants, retail traders, hawkers, theatres, &c. The licences cover a very wide area, as will be seen from the fact that one section of the Act reads as follows : 'From each astrologer, seer, fortune teller, or clairvoyant, not exceeding fifty dollars for every six months.'

Saskatchewan.

In Saskatchewan, the municipal and school taxes are levied upon lands, businesses, income, and special franchises. The councils have power to pass by-laws for bonusing, exemption from taxation, subscribing for stock, or guaranteeing the payment of debentures issued in respect of any industrial, commercial, charitable, or engineering undertaking. They can also grant to any telephone syndicate, or company of gas or electric light, or power syndicate or company, or street railway syndicate or company, any special franchise whether exclusive or not ; but such by-laws must receive the assent of two-thirds of the burgesses voting thereon. Property held by the Crown by the government of the province, every place of public worship, universities, the Y.M.C.A., hospitals, property belonging to the city and used for civic purposes, public libraries, and the income of every person up to the amount of $1,000, are exempt from taxation. A sum of money may be included in the annual estimates to be expended in the reception and entertainment of distinguished guests.

In towns revenues are raised in the same manner as in cities. Property exempt from taxation is generally the same as in cities, with the addition of grain. In rural municipalities, among the exemptions from taxation and assessment are all lands held in trust for the use of any tribe of Indians. The council of a municipality may by by-law authorize a single tax of so much in the dollar, based upon the actual value of all lands (without improvements), to raise the sum required in the estimates, but this rate shall not exceed four cents in the dollar. Statute labour is to be performed on the public roads, bridges, drains, or ditches ; provision being made for commutation.

Alberta.

In Alberta the regulations are very similar to those of Saskatchewan.

Manitoba. In Manitoba, any city having at least 10,000 inhabitants shall pay to the mayor $1,200 per annum, and to each alderman $300 per annum. Rates are raised upon the assessed value of property within the municipality. By-laws may be passed exempting from taxation in whole or part any industry for any period not exceeding 20 years, but it is necessary that such by-law shall receive the assent of the electors. Councils have also power to exempt from taxation any charitable institution, buildings used for missionary purposes, or other charitable work in connexion with Indian missions. They can also pass by-laws governing the licensing of commercial travellers, eating-houses, public exhibitions, &c., and for licensing and regulating trading stamp concerns. Under the Assessment Act, all lands and personal property shall be liable to municipal taxation, with certain exceptions, including Crown lands, municipal lands, Indian lands, public schools, churches, ships, militia horses. In rural municipalities, provision is made for the payment of an indemnity to each member of the council, together with a travelling allowance. Statute labour is provided for, and is in proportion to assessment; commutation can be arranged.

Ontario. In Ontario, all municipal, local, or direct rates and taxes are, where no other expressed provision is made, levied equally upon the whole rateable property, real and personal, of the municipality. Various property is exempt from taxation, including Crown lands, Indian lands, public educational institutions, churches, city and town halls, the personal property and official income of the governor-general of Canada, the official income of the lieutenant-governor of the province, incomes of farmers, &c. Among other persons, no innkeeper or saloon-keeper is qualified to become a member of the council. In cities having a population of 100,000 or more, there shall be a board of control, consisting of the mayor and four aldermen. The members of this board may be paid, but the sum shall not exceed for each member $1,000 per annum. Boards of control are also provided for in cities of less than 100,000 but more than 45,000 inhabitants. The salaries in such cases shall not exceed for each member $400 per annum. Councils may pass by-laws for making grants in aid to universities and colleges within Ontario, or to historical, literary, or scientific societies. Fair and market tolls, and licence fees, &c., are also provided for. A sum may be included in the annual estimates to be expended in the reception and entertainment of distinguished guests, and also an appropriation to be expended in diffusing information respecting the general advantages of a city.

Quebec.

In Quebec, it is provided that the mayors and aldermen shall not receive any salary or indemnity in any form whatsoever. Persons in Holy orders, the ministers of any religious denomination, officers of the army or navy on full pay, and keepers of taverns, hotels, or houses of public entertainment, cannot be mayors or aldermen, nor fill any other municipal office. On the polling day it is enacted that no person shall within the limits of a ward in which the poll is open, either send, lend, or deliver, or gratuitously supply, any quantity whatever of spirituous or fermented liquor. The council may make by-laws to regulate the conduct of apprentices, servants, &c., towards their masters, and the conduct of masters towards the former. The council may levy annually on every 'immovable' a tax not exceeding two per cent. of the real value, and on all land under cultivation an amount not exceeding three-quarters of one per cent. A tax is also leviable on stock in trade; on tenants, not exceeding eight cents in the dollar on the amount of their rent; a poll tax on male inhabitants who are not liable to any other taxes; taxes on all trades, manufactures, &c.; this latter tax, however, may be imposed in the form of a licence. Property held and occupied for public worship, presbyteries, parsonages, and cemeteries, buildings occupied and possessed by charitable establishments, lands belonging to His Majesty, or to the federal and provincial governments, or to the municipal corporations, are not subject to taxation.

New Brunswick.

In New Brunswick, one-sixth of the sum to be raised is levied by an equal rate as a poll tax on male persons being 21 years of age, and the residue of the sum is levied upon the whole rateable property, real and personal, and rateable income, in just and equal proportions. Various property is exempted from taxation, including cemeteries, but not churches. Any sum of money received by way of pension by a Chelsea or Greenwich Hospital pensioner is not taxable, and exemptions are made in the cases of deserted wives and widows. No person licensed to sell spirituous liquor is entitled to become a member of a council. Powers to issue licences and to charge fees therefor are also possessed by the councils.

Nova Scotia.

In Nova Scotia, all real and personal property and income, with certain exemptions, is liable to taxation for all purposes for which municipal, town, local, or direct taxes and rates are levied. Among the exemptions are Crown property; churches, school lands, colleges, school houses, &c.; funds invested in provincial debentures; fish, being the property of the person fishing for and catching the same; and ships to the extent of one-half their value. A poll tax is also leviable.

Prince Edward Island.

In Prince Edward Island all real property is liable to assessment and taxation. Such property is rated at its full cash value. Taxes are also levied under the Public Roads Act. Public lands, schools, church property, and Indian reserves are exempt from taxation.

Finance

Revenue.

The current revenue of Canada is to a large extent obtained from customs taxation, the amount paid into the consolidated fund under that heading in the fiscal year ended March 31, 1911, being nearly seventy-three million dollars ($72,965,394) out of a total of $117,780,409. Excise duties form the next most important source of income, followed by railways, post office, and Dominion lands. There are some thirty other sources of income, but as they are mostly represented by fees for various services controlled by the Dominion government, they do not call for remark. The cost of collecting customs duties amounted, in the period under review, to $2,187,174, that expenditure covering such items as inspections, preventive service, board of customs, revenue cruisers, secret preventive service, laboratory, &c.

Customs and excise tariffs.

By the terms of the British North America Act the power to raise money by any system of taxation was stated to be within the legislative power of the Canadian parliament, and it is under the provisions of a Canadian Act that customs duties are levied. The tariff at present in force is that known as the Customs Tariff of 1907, which contains three schedules: (1) the list of articles subject to duty and those entering duty free, (2) the list of articles subject to drawback for home consumption, and (3) a list of prohibited goods. The first schedule gives the rates of duty in separate columns headed respectively 'British Preferential Tariff', 'Intermediate Tariff', and 'General Tariff'. Those rates of duties, if any, set forth in the first column apply to goods the produce or manufacture of the United Kingdom and most of the British dominions. The intermediate tariff is intended to apply to goods to which its benefits shall have been extended by arrangement as in the case of the treaty with France. By Order in Council the benefit of the intermediate tariff has since been extended in part to Belgium, the Netherlands, and Italy. The general tariff applies to all goods not entitled to admission under the intermediate tariff or under the British preferential tariff.

Excise duties are levied under the provisions of the Inland Revenue Act (Chapter 51, Revised Statutes of Canada, 1906). Of the total revenue under this heading spirits and tobacco are the principal contributors.

Railways.

The Intercolonial Railway, with the Windsor branch, and the Prince Edward Island Railway, which are the only lines under Dominion government management, were for many years worked at a loss, but for the year ended March 31, 1911, there was a surplus of over $250,000.

Dominion lands.

The income derived under the general heading of

Dominion lands comprises sums represented by fees paid by persons entering for free homesteads on lands administered by the Dominion government, pre-emption and purchased homestead fees, timber, grazing, and coal land dues, mining fees, the export tax on gold, &c.

Defence and Police

Militia. There was a militia force in existence at the date of confederation, the administration of which passed from the provincial to the federal government, and as it has always been the policy of the Imperial government to hand over to Canada the responsibility of maintaining her own military force and of defending her frontiers, the British garrisons were withdrawn about the year 1870 from all stations, except Halifax in Nova Scotia, and Esquimalt in British Columbia. In 1906 these were also handed over to Canadian control. The militia force of to-day, as established by law, consists of three portions: the permanent force, the active militia, and the reserve militia. Section 10 of the Reserve Militia Act of Canada runs as follows: 'All the male inhabitants of Canada of the age of eighteen years and upwards, and under sixty, not exempt or disqualified by law, and being British subjects, shall be liable to service in the militia; provided that the Governor-General may require all the male inhabitants of Canada capable of bearing arms to serve in the case of a "levée en masse".' A certain number of persons are exempt, amongst them members of the privy council, judges, members of the executive council, clergy, telegraph clerks, revenue clerks, police and fire brigade, professors in universities, &c., together with persons who, from the doctrines of their religion, are averse to bearing arms.

The strength and organization of the forces are dealt with in Chapter XVI.

The Royal Military College at Kingston, established about 35 years ago, for the training of officers, provides an excellent education, and many graduates from it have joined the Imperial army and the Canadian permanent military force.

The Strathcona Trust.

A factor exercising an influence on the military education of the youth of Canada is the Strathcona Trust, founded by the late High Commissioner for Canada. Its object is twofold—(1) the improvement of the physical and intellectual capacities of the children while at school by a proper system of physical training, calculated to improve their physical development, and at the same time to inculcate habits of orderliness, alertness, and prompt obedience ; (2) the fostering of a spirit of patriotism in the boys, leading them to realize that the first duty of a free citizen is to be prepared to defend his country, to which end all boys should, as far as possible, be given an opportunity of acquiring some acquaintance while at school with military drill and rifle-shooting. Before a province can participate in the benefits of the trust, it must pledge itself to include in the regular curriculum of its schools instruction in physical training for the children of both sexes. The amount of the trust is $300,000, the income from which is divided annually among the provinces which have expressed their adhesion to the terms of the trust. They are not pledged to form cadet corps, but are expected to encourage their formation. The militia department makes itself responsible for the instruction of the teachers, so far as is necessary to enable them to give the special instruction required.

Navy.

The Act creating a department of the naval service was passed on May 4, 1910, and the government was empowered to appoint a naval board to advise the minister, and to organize and maintain permanent, reserve, and volunteer forces, to establish a naval college, and to place at the disposal of His Majesty for general service in the Royal Navy, ships or men of the Canadian Naval Service. It was arranged with the British Admiralty that Canada should take over the dockyards at Halifax and Esquimalt respectively, to form the bases of two naval stations, that on the Atlantic to include the waters north of 30° N. lat. and west of the meridian of 40° W., and the other on the Pacific to include the waters north of 30° N. lat. and east of the meridian of 180°.

H.M. cruisers *Niobe* and *Rainbow* were purchased, and the original intention was to build additional cruisers in Canada, but a change of government was followed by the declaration of a new policy, of which an account is given in Chapter XVI.

The Royal Naval College at Halifax is for cadets, and candidates for entry must be between the ages of 14 and 16 years, British subjects, and they or their parents must have resided in Canada for two years immediately preceding the entrance examination.

Royal North-West Mounted Police.

When making provision for the government of the territory taken over from the Hudson's Bay Company, and part of which now forms the provinces of Saskatchewan and Alberta, statutory power was given to the governor in Council under an Act passed in 1873 to constitute a police force in and for what were called the North-West Territories, and the various detachments into which the force is now divided cover not only the provinces named but the territory to the north extending to the Arctic and also the Yukon Territory. When the provinces of Saskatchewan and Alberta were formed, the question of the maintenance of the Royal North-West Mounted Police was settled by an agreement to leave the control of the force with the Dominion government, the provincial governments to pay a portion of the cost. For the most part their duties consist of patrol work, the detection and suppression of crime, and other duties ordinarily associated with a police force, but they also in various ways assist several of the government departments, particularly the departments of the interior, agriculture, Indian affairs, and customs. They also provide guards of honour for distinguished visitors, and have several times been required to accompany government expeditions to the far north.

The force is administered at Ottawa, under the supervision of the prime minister, by a comptroller, who ranks as a deputy minister. The commanding officer is styled the commissioner, and his head-quarters are at Regina in Saskatchewan. There are two assistant commissioners, and the total strength is about 650. Candidates for enlistment as constables must be British subjects between the ages of 22 and 30, intelligent, active, able-bodied men of thoroughly sound constitution, sober and steady, and must produce certificates of exemplary character from reliable persons. They must be able to read and write either the English or French language, have some knowledge of the care and management of horses, and be able to ride. The term of engagement is five years, but the commanding officer has repeatedly recommended that it be reduced to three. A recruit of less than three months' service may claim his discharge on payment of $50, but after that period it is only granted as a special privilege and on payment of $3 per month of the unexpired term of service, with a minimum payment of $50. Staff sergeants are paid $2·50 or $2·00 per day, other non-commissioned officers $1·75, constables $1·25, special constables and scouts $2·50. Members of the force are supplied with free rations, free uniforms and necessaries on joining, and periodical issues during service. The minimum height of recruits is 5 feet 8 inches, the minimum chest measurement 35 inches, and the maximum weight 175 pounds. Non-commissioned officers and constables on discharge, after completing 20 years' service, or who have completed not less than 15 years' service and are incapacitated, are entitled to receive a pension. The standard of requirements is very high, and the medical examination of candidates strict. Unless intending recruits are convinced that they are thoroughly sound and fit for service it is unwise of them to incur the expense of proceeding to Regina, which is the only point at which enlistment takes place, and in any case it is well to make previous inquiry as to whether recruiting is proceeding.

Literature.

[See Sir J. G. Bourinot, *Canada and the United States*, Philadelphia, 1898, and *How Canada is Governed*, Toronto, 1909; A. E. Bradley, *Canada in the Twentieth Century*, London, 1906; H. E. Egerton and W. L. Grant, *Canadian Constitutional Development*, London, 1907; A. R. Hassard, *Canadian Constitutional History and Law*, Toronto, 1900; A. B. Keith, *Responsible Government in the Dominions*, Oxford, 1912; A. Siegfried, *The Race Question in Canada*, London, 1907.]

CHAPTER X

NEWFOUNDLAND

BY J. D. ROGERS

Physical Conditions

Position.

NEWFOUNDLAND is an island situated between Cape Breton Island and Labrador, and is 42,734 square miles in area, its maximum length and its maximum breadth being 317 and 316 miles respectively. Cabot Strait, between Cape Breton Island and its south-western extremity, is 60 miles wide; and Belle Isle Strait, between Labrador and its northern shores, is 70 miles long and 10 to 15 miles wide. It is the nearest American island to Europe, and Ireland is the nearest European island to America; the distance being 1,680 miles between St. John's and the coasts of Galway. Ireland is about three-fourths as large and twenty times as populous as Newfoundland.

Physical features.

Newfoundland is penetrated by innumerable deep fiords, the deepest and largest of which are near the south-east corner of the island. Beginning from Cape Freels, which is the northern point of Bonavista Bay on the east coast, and proceeding southward, six successive bays or fiords will be noted: Bonavista Bay (39 miles), Trinity Bay (50 miles), and Conception Bay (35 miles), on the east coast; and St. Mary Bay, Placentia Bay (60 miles), and Fortune Bay (65 miles), on the south coast; the numbers in brackets denoting the extreme lengths of the bays inland. There are small fiords or inlets within these big fiords; and the east coast between Cape St. Francis, which is the southern cape of Conception Bay, and Cape Race, which is the southern point of the island, is honeycombed with inlets, in one of which St. John's, the capital of the island, lies hidden from sight, and in

PLATE XIX. GRAND FALLS, NEWFOUNDLAND

(Anglo-Newfoundland Development Co.)

PLATE XX. GRAND FALLS, NEWFOUNDLAND

(Anglo-Newfoundland Development Co.)

another [illegible] which Ferryland is situated. Between Cape Race and St. Mary Bay, Trepassey Harbour is an important inlet or group of inlets, and in the middle of the east coast of Placentia Bay is Grand Placentia, now called Placentia, the old French capital of French Newfoundland, which is still more hidden from sight than the English capital. Conception Bay contains, in a small south-western nook or corner, Cupid's Cove, and on its western shores the towns of Harbor Grace and Carbonear; and Cupid's Cove, Harbor Grace, Ferryland, Trepassey, and Carbonear are almost as interesting historically as are Placentia and St. John's. In the depths of Trinity Bay lies Bull's Arm Creek, which leads to an isthmus 2 or 3 miles wide between Placentia Bay and Trinity Bay. Everything to the south or south-east of this isthmus is called Avalon Peninsula; an unfertile, rock-bound, bare plateau, some 200 or 300 feet above sea-level, with a few heights almost 1,200 feet high and with many little lakes, but without rivers or mountains or valleys of any importance. Its numerous creeks, ports, and harbours, however, are of the utmost importance.

Geological divisions: first geological area.

In the folds of Bonavista Bay lies a creek called Freshwater Bay. If a straight line be drawn from this creek to Connaigre Bay, which is the westernmost inlet of Fortune Bay, all the country south and east of this line forms a peculiar geological region, intermediate between Archaean and Cambrian, and called by Mr. Van Hise Algonkian. The geological strata of this region are divided by Mr. James Howley into an upper and lower series, which he calls Avalon and Huron respectively, both being clearly Algonkian. It should be added that 'Huron', as he uses the term, comprises only a part of what is usually called Huronian by Canadian geologists The topmost sandstone of Signal Hill, which is the hill from which ships arriving at St. John's are signalled to the town, is typical of the upper or Avalon formation, which lines almost all the coast from Freshwater Bay to Cape Race, and thence almost to Placentia Harbour, the rest of the country round Placentia and Fortune Bays being almost all composed of the lower or Huron formation. On the west of Trinity Bay the Avalon formation is sometimes capped by Cambrian; and Bell Island, in Conception Bay, with its singularly rich iron mines, is said to be Silurian. From an agricultural point of view this Algonkian district is ungrateful, but for some centuries the whole historical interest of Newfoundland was concentrated on its many-dented shores. It will be observed that this, the geological line of division from Freshwater Bay to Connaigre Bay, which will be termed the first geological line of division, runs, like all the six fiords, and like all the promontories between them, from north-east to south-west or *vice versa*; and Terra Nova River, the greater part of which is east of the geological line thus drawn, also runs in the same direction. Moreover, all the strikes of strata in Newfoundland, and its only mountain range, called Long Range, all its other rivers—Gander, Exploits (which is its greatest river), and Humber (which is its second greatest)—and all its most important lakes, such as Red Indian Lake, Grand Lake, and Deer Lake, conform to the same rule.

Long Range, which is Laurentian, or the most primitive form of Archaean, forms a geological as well as a geographical boundary, and everything west of it belongs to the Palaeozoic or so-called Primary geological formation, of which Cambrian is the lowest and Silurian is the next lowest stratum; so that the western edge of this range may be regarded as the second line of geological division. As the first geological area lies east of the first geological line, so the third geological area lies west of the second geological line of division, and the second area lies between the two lines.

Extent of the third geological area.

The following districts, rivers, and bays lie wholly within the third geological area, or the area which lies west of the Long Range: the Codroy Rivers, where grassy valleys decorated with yellow birch and balsam firs supply the best dairy produce, and some of the best agricultural produce in the island; the wooded slopes of Cape Anguille; St. George's Bay; the Bay of Islands, including Humber

Arm and Humber Mouth, where the Humber River debouches and the town of Birchy Cove is situated; Bonne Bay; Parson's Pond, where there is oil; Ingornachoix Bay and St. Barbe. The settlements in St. George's Bay and Bay of Islands attain the dignity of towns and are capitals of the west; Ingornachoix and the Bay of Islands are particularly interesting to Englishmen as the principal scenes of the first of the many masterly oceanic surveys made by Captain James Cook (1768). The Humber is the only river which pierces Long Range, and links what is east of it with what is west of it. Through this gap the railway runs, and the only Carboniferous formations east of Long Range lie in and around Humber River and the lakes into which it or its tributaries expand.

Physical conditions of the third geological

In the third geological area the formation of the southern section between Cape Anguille or the Little Codroy River and Bay St. George inclusive is Carboniferous, and it was in this district, on Great Barachois River (an arm of Robinson's Brook), that Jukes found coal (1839). From thence northward to Humber Arm, Bonne Bay, and Pond's River, a few miles south of Ingornachoix Bay, a Silurian strip, some 10 to 20 miles wide, lines the ocean; and here asbestos has been found in Port-à-Port Bay, and oil at Parson's Pond. The Carboniferous strip (including coal measures) reappears east of this Silurian strip and east of Long Range, at and between Deer Lake, Birchy Pond, Sandy Lake, and a part of Grand Lake, and along those parts of the Humber which connect these lakes. Further north, Ingornachoix Bay is Cambrian, but the country to the north of Ingornachoix Bay is Silurian, except at St. Barbe, where there is a narrow strip of Cambrian, which corresponds to a similar but much longer strip of Cambrian sandstone between Bradore Bay and Chateau Bay on the coast of Labrador, on the opposite side of Belle Isle Strait. This and other correspondences between the two sides of the strait point to a time when the strait did not exist. The coal measures of the Carboniferous formations are similar to those at Pictou in Nova Scotia and Inverness in Cape Breton Island, and of the same geological horizon as those in England. But the coal has not been worked to any extent. Coal measures are the most recent geological strata in the island. The third geological area is the most fertile in the island from an agricultural point of view, but it is very hilly, some of its hills being composed of intrusive granite, serpentine, or diorite of uncertain age.

The second geological area.

The second geological area, with a few exceptions, is the most unfertile in the island. Long Range is of Archaean gneiss, mica-slate, acid volcanics, and the like, and runs along the whole length of the island at a height rarely exceeding 2,000 feet from 'the bold bare barren heights' of Cape Ray, which is the south-westernmost point of the island, to Canada Bay in the north-east of Petit Nord, as the thick chimney-shaped promontory between White Bay on the east, Parson's Pond (or thereabouts) on the west, and Cape Bauld, in the far north, used to be called. It reappears in Belle Isle and the rocky islets of Chateau Bay on the Labrador coast. It is a continuation of the Laurentian system which runs through Cape Breton Island from near Port Hastings to Cape North, and is flanked, as Long Range is flanked, on its western rim by Carboniferous outcrops. Except for a thin strip of Silurian on the west coast of White Bay, the west coast of Newfoundland, from Canada Bay to Fleur de Lys Harbour, is also Laurentian. From thence to Cape St. John, and from Cape St. John to the mouth of the Exploits river, are some hundreds of narrow creeks, in many of which—notably in Tilt Cove, Betts Cove, and Little Bay—copper is or has been worked. The formation in which the copper of Tilt Cove occurs was described by Alexander Murray in the following ascending order: (*abc*) slates with red jasper, (*d*) diorites with green slates, (*g*) dolomite, (*i-k*) diorite and serpentine, (*l*) steatitic slates with red jasper, (*ef, h*) copper carbonates, copper 'specks', and copper sulphurates amid black and green slates, jasper, diorite, or serpentine; and he relegates it to the Lauzon division of the Quebec series (Murray and Howley, *Geolog. Survey of Newfoundland*, pp. 103, 125)—that is to say, to Lower Silurian—but it is possibly of an Upper Archaean or Algonkian Age. Serpentine and diorite formations run inland from the coasts of this copper-bearing belt, sometimes for 20 miles. The coast between Cape St. John and the mouth of the Exploits forms the western half of what is called Notre Dame Bay; the eastern half ends in Ragged Harbour, which is on the same meridian as the east point of Fogo Island. This eastern section is Silurian; and a broad Silurian strip, well wooded and well watered, runs thence almost to La Poile Bay, near the western extremity of the south coast. This strip includes the Exploits River and its lakes (Red Indian Lake and Victoria Lake). The dense woods which surround them have been felled since 1905 by the Anglo-Newfoundland Development Company and other timber, wood, and pulp companies for purposes of lumber, pulp, and paper-making. The lower half of the Gander River is similar in its industry and geology. Notre Dame Bay is not itself a fiord, but it is full of numerous creeks which are fiords in miniature, and of islands, chief among which in size and historical importance are Fogo and Twillingate.

Leaving Notre Dame Bay on our west, we arrive at Cape Freels, which derives its name from Friar Lewis (Frei Luis), the companion of the early Portuguese explorers, who discovered this coast in the early sixteenth century. Cape Freels is the northern point of Bonavista Bay, and the whole country between it and Ragged Harbour on its west, and between it and Freshwater Bay in the middle of Bonavista Bay to the south, is Laurentian. Bonavista Bay, like Notre Dame Bay, is distinguished by its many islands, of which Greenspond, where its capital town is situated, is of some historical importance.

It will be seen that the Exploits and the greater part of the Humber and Gander and the neighbourhood of Bay D'Espoir are Palaeozoic, and the copper zone is also non-Laurentian. With these exceptions the second geological area south of Petit Nord and east of Long

Range consists of barren bare uplands, hard and stony, with marshes of deep spongy caribou moss, beds of dwarf 'juniper' breast high, occasional tree-tufts, and countless lakes and tarns.

The rivers themselves are puny compared with Canadian rivers, and shallow even from a European standpoint, but furnished useful means of transit to North American Indians, and abundant salmon both to them and to Europeans.

Climate.

Although Cork, on the south coast of Ireland, is north of the northernmost part of Newfoundland, the climate of Ireland is far warmer than that of Newfoundland; the annual mean for St. John's (about 41° F.) being often only one or two degrees more than the January mean for Dublin. From the east of Greenland and the east of Baffin Land two arctic currents unite off Labrador and the united current passes south along the coasts of Labrador and Newfoundland, bringing ice-floes in late winter and icebergs during the greater part of the year. The sea freezes every year, and Belle Isle Strait is choked with ice during winter and spring, though the thermometer on land rarely stands at less than zero Fahrenheit. The icebergs are from the glaciers of east Greenland, and consist, therefore, of congealed fresh water, which on melting dilutes and changes the colour of the salt sea.

Marine fauna.

The ice-floes of spring bear with them the bay seals, the harp or Greenland seals (*Phoca Groenlandica*), and the hooded seals (*Cystophora cristata*), which bring forth their young upon the ice in February; and the young, or rather their oil and skins, are marketable in March. The herrings of May, the caplin of June, the squid (or cuttle-fish) of August, and the herrings of September invite the codfish to the eastern and southern shores of Newfoundland in vast numbers.

The Banks.

The Banks of Newfoundland—a series of submarine plateaus less than 100 fathoms deep and as large as Newfoundland, south and south-east of which they lie—are a favourite haunt of the cod. Here, in summer, the arctic current and Gulf Stream meet; and on the gravelly and sandy surface of the plateaus myriads of invertebrates furnish food for cod or the fish and cephalopods on which the cod thrives. The Banks lie south of the latitude of the north end of Conception Bay; the westernmost bank, that of St. Pierre, is south of St. Pierre Island, which lies off Fortune Bay on the south coast; and the principal bank or Grand Bank is far out in the Atlantic. These banks resemble some shadow of the island of Newfoundland cast upon the ocean by the setting sun in summer.

Land fauna and vegetation.

The indigenous island fauna include great auk and walrus (both of which are extinct), beavers and otters (both of which are becoming rare), fox, lynx, marten, musk-rat, North American hare, wolf, black bear, white bear (on ice-floes only), willow-grouse, ptarmigan, razorbill, puffin, and, above all, the caribou or American reindeer. The caribou spend winter in the south and summer in the north, and they bring forth their young in May, and migrate to and from the north in March and October respectively. There are no snakes, and were no frogs. Frogs, Norwegian reindeer, and all the domestic animals, including, it is supposed, dogs, have been imported. The salmon is the principal freshwater fish

The flora include fir-trees, spruce, larch (which includes so-called juniper), and birch; and more rarely wych, mountain ash, alder, balsam poplar, and aspen. Fruits include crowberry (*Empetrum nigrum*), cranberry (*Vaccinium oxycoccus macrocarpon*), blueberry (*Vaccinium uliginosum*), cowberry (*Vaccinium Vitis-Idaea*), and partridgeberry (*Gaultheria procumbens*).

Population and Settlement

Nationalities.

The population of Newfoundland consists, or has from time to time consisted, of Beothics, Micmacs, Eskimos, British, and French. The Eskimos, who were probably visitors from Labrador, have gone north; the Beothics, who were the original natives, are an extinct race; the Micmacs, who were probably visitors from the south, are about 200 in number, and occasionally some half-dozen Montaignais from Labrador mix with them; few French remain as settlers, and among the British settlers, Englishmen from the south-west of England and Celtic Irishmen were conspicuous by their presence and Scotsmen were conspicuous by their absence during more than the first 250 years of the British occupation. Probably at the date of the conquest of Canada (1763) there were more Celtic Irishmen in Newfoundland than in the whole of America; and there were no Scots, or scarcely any, in Newfoundland, although Scotsmen formed the backbone of the North American colonies, and almost monopolized the settlements of the Hudson's Bay Company.

Icelanders (1000–6) discovered and John Cabot (1497) rediscovered Newfoundland; but the former discovery was forgotten and the rediscovery by Cabot led only to annual fishing excursions from western Europe. Cabot was in the service of Henry VII, King of England, when he made his discovery, and in 1583 Sir H. Gilbert, under a patent from Queen Elizabeth, proclaimed English sovereignty over the island at St. John's, but did not plant any settlement in the island. The fishermen of many nations continued to visit the island after as well as before the proclamation, and amongst these visiting fishermen Basques, Bretons, Devonshire men, and Portuguese were foremost. Probably the majority of the Basques were French, but there were many Spanish Basques also; and the Bay of Islands once bore a Spanish name, and such names as Spaniards Bay, in Conception Bay, denote that Spaniards and Englishmen met there. Shortly after the French settled in the island they drove away the last of the Spanish fishermen. The Portuguese, who left their name to Portugal Cove in Conception Bay, disappeared from the fisheries at a still earlier date. All the annual European excursionists left Europe in spring and returned in autumn.

Early British settlement.

No settlers of any European nation arrived until John Guy of Bristol led out a colony of settlers from the south-west of England to Cupid's Cove in Conception Bay (1610);

and this colony afterwards founded a branch colony at Harbor Grace in the same bay. Before 1628 the branch colony became the trunk, and the settlement at Cupid's Cove eventually disappeared, although its name is mentioned in the records until nearly the close of the century. This branch colony was at first called Bristol's Hope, and probably assumed its new name—which was the usual English corruption of Havre de Grace (at the mouth of the Seine)—at the time that the French port began to play a part in James I's naval operations against France. A second independent colony under Vaughan and Whitbourne settled at Trepassey (1616). There were two other colonies projected by Lord Falkland, one near Reneuse, and the other between Bonavista Bay and Trinity Bay (1623); but Lord Falkland never came near the island; his northern colony never existed except on paper, and his southern colony had no effect of any consequence. In 1621 Lord Baltimore (aided by Captain Wynne) founded an important settlement, Ferryland, and about the same time St. John's appears as a colony that had nothing to do with its sister colonies. The colony of Ferryland or Avalon is of equal importance with the colonies of Cupid's Cove, Harbor Grace, and St. John's in the early history of Newfoundland.

Avalon is a Somersetshire name, which Lord Baltimore, who came from Somersetshire, bestowed on his colony; and this name was shortly afterwards used for what is now called the Peninsula of Avalon. This peninsula was now solely in British occupation, on that side of it which faced Europe. No one went inland. The colonists lived by fishing in boats near the shore and only used the shore for their houses and gardens, for ground and stages for drying and salting cod, and for occasional trapping, shooting, and boat-building in winter. In the whole peninsula there were no settlers except British settlers; and they occupied detached ports in Conception Bay and along the east coast further south, and claimed to occupy Trinity Bay. The foreign annual fishermen avoided bays and coasts in which there were British settlers and transferred their industry elsewhere. The settlers did not drive away the annual British fishermen, who still made their ocean trips to and fro and competed with them ; but the fishermen in ships were at a disadvantage compared with the fishermen in boats, and gradually adopted the method of fishing with boats only, the ship-owners' boats being usually kept or hired in the island. The travellers from afar were favoured by the home government, which relied on the maxims that long voyages make good sailors, and that good sailors make a country great ; accordingly these travellers were allowed first choice of drying grounds, and in order not to interfere with their drying grounds the settlers were forbidden by charter, Orders in Council, and otherwise, during the whole of the seventeenth century, to build houses near the shore—a prohibition which was universally ignored—and although there was usually some one, like Sir D. Kirke (1637–51), who claimed to be governor of the whole colony or group of colonies, there was never any governor whom any of the travellers or all of the settlers looked up to as governor until 1675. The travellers claimed to be autonomous under a so-called admiral of their fleet, and the colonial governors vainly disputed their claim. The travellers also claimed fishing easements on the shore and the right to regulate the fishing easements of the settlers ; but the settlers asserted with success a prior right to the parts of the shore where they actually settled, although for the first two centuries they never ventured to assert rights of property in land. Therefore, travellers and settlers perpetually quarrelled ; and the English part of the island was anarchical until captains of English royal or state ships were sent out to convoy the fishing fleet to and fro, and to act as commissioners of inquiry, or for establishing law and order.

The first commissioners of this kind were laymen as well as officers of the navy who were sent out under the Commonwealth (1651 et seq.) to preserve the colony from supposed Royalists. But the system of sending out naval captains as commissioners only became habitual in and after 1675 in consequence of the French occupation of Placentia. The earliest of these commissioners were required to report whether it was politic that the colony should continue its existence, and unanimously reported in the affirmative. They also prepared the first statistical accounts of the colony, and after 1675 officers of the Royal Navy were sent out annually to convoy the fishing fleets from England, if necessary, and to continue these inquiries and statistical accounts. While they were in the colony they also acted as governors; but it was long before they assumed that title. The word 'governor' came into use during the wars with France, sometimes as the title of the naval officer (1699 et seq.), sometimes in order to denote the military officer in command of the garrisons during winter when the naval officer and his ships were always absent from the colony. The first garrison arrived in 1697, and with it the first minister of religion of any denomination who had ever set foot in the British colony since 1629. After the war was over the garrison was withdrawn, but a prominent citizen was frequently elected or nominated without legal sanction to maintain order during winter.

In 1728 the title and office of governor was permanently conferred by Order in Council on the officer commanding the king's ships on the station at Newfoundland, and although this appointment was made annually it became the practice to appoint the same officer for three or four successive years, and although no governor was ever present in the colony during winter until 1817, each governor was authorized by his commission to provide for the maintenance of law during his absence. The laborious evolution of law-courts, constables, naval officers, and custom-houses took place between 1728 and 1813; at which last-mentioned date the so-called admirals of the fishing fleet which plied between England and Newfoundland were finally deprived by Act of Parliament of the judicial functions which they had claimed to exercise from time immemorial.

This process of turning an ungoverned into a governed colony was effected by naval officers and to a less extent by military officers; and the presence of these officers between 1675 and 1713 was due to the existence of a French colony in the neighbourhood of the British colony in Newfoundland.

French colonization.

In 1662 French soldiers and settlers occupied Placentia on the east coast of Placentia Bay, which was almost unknown to the English travellers or colonists. Long ago French fishing ships used to frequent the south coasts of the island and to assemble in Placentia Bay year by year (e. g. 1594); and Breton fishing ships discovered Belle Isle Strait before Cartier passed through it on his first voyage of discovery in St. Lawrence Gulf (1534). Ever since 1608 French colonizing efforts were concentrated on Quebec and Montreal; and it was only in 1660 that French statesmen decided to found a half-way house between France and Quebec close to the old French fishing grounds in Placentia Bay. The French colony was military from the first, and contained a garrison, a commandant, who was also governor, and various officials and priests; otherwise it resembled the British colony in its fishing settlers, and in the competition between the latter and the itinerant French fishermen. Like the British settlers, the French settlers hugged the shore. The French government tried to keep their settlers in or near Placentia, but the settlers possessed detached settlements at Hermitage Bay (which is just outside Fortune Bay, being one or two miles beyond Connaigre Bay) at the time of the Treaty of Utrecht (1713), and on various points on the intervening coasts. In 1698, owing to attacks by French on English settlers, to which reference must be made later, the English settlers reached the north coast of Bonavista Bay. Consequently what has been called the first geological area, that from Freshwater Bay in the west of Bonavista Bay to Connaigre Bay in the west of Fortune Bay, was lined by settlers, after a century of colonial effort on the part of two great colonizing nations; and at both ends of the line there was an overflow of settlers into one or two adjoining bays just outside this area. The limits are significant from an oceanic as well as from a geological point of view. If one line were drawn eastwards out to sea from Freshwater Bay, and a second line were drawn south-eastward out to sea from Connaigre Bay, and the two lines were joined in the Atlantic some 300 miles from their starting points, they would enclose the Newfoundland Banks.

The French fishing colonists, like the British fishing colonists, included servants as well as permanent settlers. Servants were men who came for two summers and one winter to help in fishing; and British servants came almost exclusively from the south-west of England, or from the south of Ireland; and it was from these servants that the ranks of the British settlers were mainly recruited. The colony of Newfoundland down to the late nineteenth century was almost exclusively Anglo-Irish. Every naval captain in his annual tour compiled statistics of population and of the fisheries, all of which were admittedly imperfect, and many of which are partly copies of the statistics compiled in previous years. Still, they are of considerable value, and show that the British settlers and servants were more numerous than the French settlers and servants; but it must be remembered that there was also a French garrison before a British garrison existed, and that the presence of servants during winter was largely a matter of national habit. The British settlers were about 600 in number and lived in some 40 ports: in all of which (and in some adjacent ports) more than half the colony have always lived. All the 200 odd French settlers also lived then in the same ports on both sides of Placentia and Fortune Bay, where settlers live now, but in far fewer of those ports.[1]

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[1] Statistics of population in Anglo-French period (1662–1713) are as follows:—

British settlers	523 (1677); 817 (1706)
French ,,	166 (1687); 225 (1710)
British servants	1342 (1677); 1565 (1708)
French ,,	474 (1687); 354 (1710)

The British settlers lived (1675–81) on the coast in:—

1. Trinity Bay; at Bonavista, Trinity, Bonaventure, Little Harbor.

Indians. The French and English settlers differed in their relations with natives. The only native American Indians of Newfoundland were Beothics, a kind of Indian as unlike any other North American Indian as Algonkin is unlike Iroquois. They did not frequent the Peninsula of Avalon and were only seen once or twice in the early seventeenth century as far south as Trinity Bay, after which they were scared back to their home by Red Indian Lake, which is an expansion of the Upper Exploits River. They used to paddle down the Exploits River, and visit the islands of Notre Dame Bay for eggs every year, but caribou and freshwater fish were their staple food. They had no dogs. When in the eighteenth century British salmon fishers reached as far north as the Exploits (*c.* 1762), hostilities began, which ended in the total disappearance of the Beothics between 1822 and 1827, except for one woman who died in a St. John's hospital in 1829. It has been suggested that some wild Indians who appeared at the Bay of Seven Islands in Labrador (1831) were the last of the Beothics (Bonnycastle, *Newfoundland*, ii. 251), but this is mere guess-work. No one knows whither they went or whence they came, and the British colonists made nothing whatever of their aboriginal neighbours. Doubtless British settlers mismanaged the native question; but it must not be assumed that the British colonists caused, although they undoubtedly contributed to, this mysterious disappearance.

The Micmacs were the chief offenders. The French on their first appearance in the island as settlers were attended by Micmac hunters and trappers (1662). The Micmacs were Algonkins from Cape Breton Island who came over Cabot Strait in their frail canoes to hunt the

'Barrow', Ragged Harbor, Witless Bay, Heart's Content, New Perlican, Scilly Cove, Hants Harbor, Salvage Point, Old Perlican.

2. Conception Bay; Bay Verde, Carbonear, Harbor Grace, Mosquito Cove, Bryan's Cove, Robert's Bay, Port de Grave, Cupid's Cove, Brigus, 'Briskett' Bay, Harbor Maine, and Portugal Cove.

3. On the south-east coast at Torbay, Quidi Vidi, St. John's, Petty Harbor, Bay Bulls, Toad's Cove, 'Ballina', Briqus, Caplin Bay, Ferryland, Aquafort, Fermeuse, Renouse, and Trepassey.

caribou on the barren lands north of Bay D'Espoir and Cape Ray, and it is possible, although there is no reason to suppose, that they preceded the French. In 1680 or thereabouts—if Cormack's date is correct—the Micmacs advancing from the south, probably from Bay D'Espoir, attacked the Beothics with French weapons on 'Shannoc brook', a tributary of the Exploits to the west of Great Rattling Brook, and almost exterminated them. After this battle Micmacs were never seen within, and Beothics were never seen outside, the valley of the Exploits and its tributaries. Neither French nor English tamed the Beothics, but French friendship for the Micmacs and other Algonkins of Labrador and elsewhere had important effects upon the history of the British as well as the French colonists.

When the European war broke out between France and England (1689 to 1713) Frenchmen guided by Indians marched inland from Placentia, by ways deemed impossible by British settlers, and raided the British settlement some three or more times. It was felt that two hostile powers could not live so near one another in so primitive an island, and accordingly in 1713, by the Treaty of Utrecht, all the French settlements in or off Newfoundland were transferred to Great Britain, and the French settlers, or most of them, went to Louisbourg in Cape Breton Island. The islets of St. Pierre and Miquelon at the foot of Fortune Bay were assigned to Great Britain by the Treaty, but were re-transferred to France at the close of the Seven Years' War by the Treaty of Paris (1763), when they became once more a colony for settlers of the old type and the rallying point for French fishermen. These islets are still French and are the only colonies which France retains in North America. Meanwhile British settlers gradually drifted into what had been the French settlements of Placentia and Fortune bays.

After all or most of the French settlers left Newfoundland (1713) Micmac hunters did not cease to visit southern Newfoundland, and 300 Micmacs arrived in Bay D'Espoir in 1765. In Cormack's time there was a Micmac settlement in Bay D'Espoir (1822), and a few hundred Micmacs still live on Conne River, Bay D'Espoir. It is uncertain whether or not the origin of this Micmac settlement was the movement of 1765 mentioned above.

Colonial expansion. Every British settlement that was made in Newfoundland since the first six colonies were founded, represented or resembled an overflow from some adjoining or adjacent bay; and no body of settlers went far from their fellows until after the Treaty of Paris, when a few British settlers began to occupy St. George's Bay, some 150 miles from their neighbours (before 1783), and one or two of these detached settlers went to live at Humber Arm (1780 ?) and Bonne Bay (1809 ?). In all these settlements Micmacs took part, selling game and fish and sometimes marrying their daughters to the white settlers, so that the unwonted character of these settlements may have been partly due to Micmac influence. These three settlements on the west coast became the nucleus of the present settlements on the Treaty coast, or that coast upon which fishing rights were guaranteed to the French by the Treaty of Utrecht.

While establishing British sovereignty over the entire island, the Treaty of Utrecht reserved to French visitors fishing rights between Cape Bonavista at the northernmost point of Trinity Bay on the east coast, and Point Rich north of Ingornachoix Bay on the west coast. These rights included a right to land on the coast and dry fish; but did not exclude others from the exercise of similar rights. The Treaty of Versailles, at the conclusion of the War of Independence (1783), substituted Cape St. John for Cape Bonavista, and Cape Ray for Point Rich; and the Declaration of Versailles (1783) added an undertaking that the British king would remove British settlers from the Treaty shore, and would prevent British fishermen from interfering with French fishermen. This declaration was embodied in an Act of Parliament (1788), without which it would have been unenforcable, infringing as it did the first principles of British freedom. If

PLATE XXI. STAR RIVER FALLS, NEWFOUNDLAND

(Anglo-Newfoundland Development Co.)

PLATE XXII. STAR RIVER FALLS, NEWFOUNDLAND
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the Act had been carried out the settlement on St. George's Bay would have been razed to the ground; therefore it was partly carried out and partly evaded by men of war of both nations amid constant friction on both sides until 1904, when the provisions of the Declaration of Versailles and of the Act of 1788 were abrogated by treaty. Meanwhile, St George's Bay and the other west coast settlements lived under a cloud and had no judicial, local, or political institutions until 1862; and St. George's Bay and what is now St. Barbe district further north became electoral districts for the first time in 1878. Before that date La Poile and Burgeo electoral district had been formed (1855) so as to comprise a long line of tiny scattered fishing settlements on the innumerable creeks and islands of the south coast west of Fortune Bay, which during the preceding thirty or forty years had been gradually filling up the interstices between Hermitage Bay and St. George's Bay. St. Barbe district had been peopled at the same time, and the present continuous ring of settlements round the south and west and north-east coasts of the island dates from about the year 1850. But the beginning of the movement for joining hands by establishing a connected series of settlements between Fortune Bay, St. George's Bay, Bay of Islands and Bonne Bay, and all round the coasts of Petit Nord dates from 1818 or thereabouts. In stating what was the cause of this movement we must recur to some of the facts which have already been referred to incidentally.

If the reader will look back on what has been written, he will note four periods at which the colonization of Newfoundland made a departure in some new direction. The first new departure took place in consequence of the French occupation of Placentia (1662): it was mainly political, but it also meant closer settlement on the coasts occupied by the old British colonists, and it was due to the spirit of Anglo-French competition. The second new departure was due to the natural outburst of energy, which inspired Englishmen after the conclusion of the long Anglo-French wars which were waged from 1689 to 1713.[1] Then it was that the colonists began to fish for salmon and to catch bay seals, on or near the Laurentian coasts between Cape Freels and Ragged Harbour (1718 seq.), then, too, the islands of Fogo and Twillingate were inhabited (1733) and began to serve as centres for these new industries and as bases, amongst other things, for seal-fishing. The tide of settlement had now reached the eastern threshold of Notre Dame Bay; meanwhile, in the south, settlers were occupying the vacant homes of the departed Frenchmen in Placentia and Fortune bays, and among these immigrants Channel Islanders and Irishmen were conspicuous. In 1722, we hear of a salmon-fishing establishment at Salmonier on St. Mary's Bay, which lay half-way between the old French colony and the old English colony; so that the former gap between the two colonies began to be filled up. The two other dates after which colonial energy began to seek new outlets were 1762 and 1818, when the long line of connecting links between south-west, north, and north-east began to be formed. These two dates are also the approximate dates when the long Anglo-French wars were concluded. Reference has already been made to the year 1762 as the year in which English salmon-catchers

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[1] The following figures show how in the eighteenth century settlers began to outnumber visitors:

	average 1725–7	average 1733–5	average 1736–40	average 1748–50	average 1764–74
Masters, women and children	1,380	1,720	1,660	2,470	5,660
Other residents in winter	1,320	1,380	2,190	3,480	6,670
Total	2,700	3,100	3,850	5,950	12,330
Summer fishermen from England and Ireland	2,390	3,050	2,630	2,980	5,430
'Passengers' of do.	1,630	2,110	3,200	4,390	6,450
Total	4,020	5,160	5,830	7,370	11,880

Probably half of the 'passengers' never returned to England but settled in Newfoundland or America.

The first four columns are from original records; the fifth from the Second Report on Newfoundland, 1793, App. 6, H. It is assumed that masters, women, and children formed part of the winter residents.

reached the mouth of the Exploits River and fought with the Beothics. This move forward was as significant from a geographical as well as an ethnical point of view, for it meant that the eastern half of Notre Dame Bay, or the Silurian section of the bay, was now in British occupation. Because the valley of the Exploits was Beothic territory, and because the settlers and Beothics could not agree, the copper coast, or the western half of Notre Dame Bay, was avoided; and in 1762 we hear of one settler at Sop's Arm in White Bay, that is to say, west of Notre Dame Bay, but this plan of jumping over the Beothic sphere of influence, and of beginning afresh beyond it, was baulked by Frenchmen, who now began to reassert their fishing rights on the coasts north and west of Cape St. John.

Union of Labrador with Newfoundland.

During the long wars of the Austrian Succession and of Frederick the Great, French fishermen had neglected the northern and north-eastern coasts of Newfoundland, but they returned there in force after the Treaty of Paris (1763). This treaty in giving French Canada to Great Britain gave with it Labrador. Accordingly, as there was no room for British fishermen or rights for British settlers in the midst of the French fishermen, the men of Fogo and Twillingate and Sop's Arm made a leap over the French as well as the Beothic reserves and set up fishing establishments in Labrador. Sop's Arm was abandoned, and Fogo and Twillingate acquired a new significance as bases of the Labrador fishery. The union between the east coast of Labrador and Newfoundland which has endured ever since is due to this sudden leap forward, which again was due to the fishing rights of the Frenchmen. The Labrador fishery proved to be a valuable extension of the east-coast fisheries of Newfoundland and led to the enrichment of the whole colony. People also from the west of England, such as Major Cartwright, Jerseymen from Jersey, and Moravian missionaries cooperated with the Newfoundlanders in the new venture. In 1763 Labrador, Anticosti, and the Magdalen Islands were united to Newfoundland by proclamation; in 1774 they were reunited to Canada; but Labrador and Anticosti were given back to Newfoundland (1809–25), and lastly (1825) that part only of Labrador which lies east of a line drawn from Blanc Sablon due northwards to lat. 52° and thence to Hudson Strait was permanently annexed to Newfoundland.

Native Eskimos and Montiagnais.

The advance to Labrador brought Newfoundlanders into contact with the Eskimos of Belle Isle Strait. The Eskimos hate and are hated by North American Indians, and their habits differ. The Eskimos hunt whales, walrus, and seals, eat raw meat, use dogs (which are according to some authorities tame wolves), and avoid inland districts. The American Indians of eastern North America live by hunting land animals, cleave to rivers, rarely use dogs, and usually avoid the sea. In 1638 or thereabouts the Eskimos murdered French fishermen somewhere near Croc in Petit Nord; and thenceforth the North American Indians became friends with the French, obtained firearms from them, and gradually exterminated the Eskimos on the north shores of the Gulf of St. Lawrence. Nevertheless, Eskimos frequented Cape Bauld, Quirpon Island, as late as 1764, and made friends with Sir Hugh Palliser, then Governor of Newfoundland, and with the English shortly afterwards, but they retired further north as English settlers arrived. Conversely, a French settlement which had been made in Bradore Bay, Labrador, between 1713 and 1763, had lured a few Montaignais, who are Algonkins, from the inland solitudes of Labrador, southward to Newfoundland, where they mixed and intermarried with the Micmacs. Cormack met one or two Montaignais (1822), and a few are still to be seen in Newfoundland.

Permanent settlers.

In the eighteenth century the permanent settlers gradually outnumbered the fishermen who came from Europe. In the early part of the century the European fishermen began to cultivate more distant fishing grounds on the Grand Banks of Newfoundland; in the later part of the same century they betook themselves to Labrador. After the Napoleonic wars the European fishermen ceased to cross the Atlantic in large numbers, or else sought the coasts of Labrador, which were then beginning to be important fishing grounds. In the early nineteenth century shipbuilding began in Newfoundland, so that the settlers began to compete successfully with the fishermen who visited them from Europe on oceanic fishery grounds and on the distant coasts of Labrador, as well as in the near neighbourhood of their own coast. Therefore the Europeans were doubly beaten.

Religion.

Irishmen threatened to outnumber Englishmen in the colony during the eighteenth and the first half of the nineteenth century. If we may assume—and the assumption is not unreasonable—that in the nineteenth century Protestants were Englishmen and Roman Catholics were Irishmen, Irishmen and Englishmen were to one another as 50·6 to 49·4 in 1836, as 48 to 52 in 1854, as 42 to 58 in 1869, and as 66 to 34 in 1901; 93 per cent. of the Protestants in 1901 were Anglicans or Wesleyans. The figures are important because when the numbers of (Irish) Roman Catholics and (English) Protestants were nearly balanced Irish riots were frequent.

Convicts.

Newfoundland was never a convict settlement, although a few convicts were sent there from England or Ireland in the early eighteenth century. As the contrary has often been asserted, the following extract from Captain Osborn's Report on the Fishery for 1731 may be once more cited: 'It is now become a practice of masters of ships to bring over here transported felons instead of Irish servants.'

Government and Economic Conditions

Government.

The governor became a resident governor in 1818, but as yet, like the early Australian governors, he was unprovided with any executive or other council. Sir Thomas J. Cochrane (1824–34), the first governor of Newfoundland who devoted himself seriously to road-making and agriculture, was also the first governor who was helped or hampered by a council; and in the last two years of his command (1832–34) representative institutions were in force, that is to say, there was an executive and legislative council consisting of some ten members, who were either officials or nominees of the governor, and a legislative assembly consisting of the representatives of nine electoral districts, all of which were sea-ports or bays. In 1855, which was the year in which responsible government was introduced into the Australasian colonies—except New Zealand, which already enjoyed it, and Western Australia where it was shortly afterwards introduced—responsible government was introduced into Newfoundland. Owing to the splitting up of existing districts and to the addition of La Poile and Burgeo district, the nine electoral districts were increased in number to fifteen in 1855, and there were thirty instead of fifteen members. With the addition to the constituencies of St. George's Bay (1878), and of what is called St. Barbe District (1878), in consequence of the progressive occupation of hitherto unsettled districts, and owing to the separation of Fogo from Twillingate (1885) in consequence of the prosperity which these towns derived from the then recent discoveries of copper on the copper coast of Notre Dame Bay, the constituencies were afterwards increased to eighteen, and the members to thirty-six in number. Under responsible government the Crown appoints the governor for a term of about five years, the Governor-in-Council nominating the fifteen members of the Legislative Council for their respective lives. The Legislative Council corresponds to the British House of Lords, and the members of the House of Assembly, which corresponds to the British House of Commons, are elected for four years by voters who enjoy household suffrage.

Industries: Fisheries.

The principal industries of this island are fishing or industries like rope-making, boat-building, and ship-building, which assist fishing; and the principal fish is cod. The one unchanging factor in the history of the island is the never-ceasing cult of the inexhaustible cod. Cabot caught cod by letting down hampers into the sea; cod are caught within the three-mile limit almost all round the coast; and where cod are scarce or non-existent, as in Hare Bay in the far north, there are hardly any inhabitants. About 250,000 quintals of cod were exported from the little old British colony of 1675–7; and about 500,000 quintals were exported a century later from the colony, which then included the old French as well as the old British colony.

During the nineteenth century almost the whole of the colony and of the adjoining coasts of Labrador have been fished, and the average annual catch in the nineteenth century equalled 1,000,000 quintals. As the area of pursuits widened, the yield increased, but not in proportion. The earliest British colonists seized the best points of vantage; the earliest French colonists seized the next best points, and the whole of Labrador only exports what the early British fisheries on the coast of the peninsula of Avalon yielded in the years 1677 to 1681. Three-fourths of the exports of cod go to Brazil, Portugal, Italy, and Spain, which pay little or nothing in return to the exporters directly. Payment is made by imports of meat, bread, and butter—half from Canada and half from the United States—and of clothes from England, and coal from Canada; all these imports together being, as a rule, a little less in value than the total value of the exports of cod. Brazil and the Mediterranean owe the debt which Canada, the United States, and England pay; the paying states recouping themselves by their trade with the owing states. Thus the cod sets in circulation a current of trade which runs round the world; Newfoundland is the starting point of the current and the goal to which it returns. Herring were regarded as of value only as food for cod until the middle of the nineteenth century, but the pickled and frozen herring trade began to assume considerable proportions during the second half of that century, and the herring became food for human consumers. Americans and Canadians are the principal purchasers; and the principal fishing grounds for herring are at St. George's Bay, and the Bay of Islands on the west coast. Lobsters did not become important articles of merchandise before 1880, nor did whales before 1897. The chief haunts of the lobster were Ingornachoix Bay and St. Barbe and other places on the west coast, and Nova Scotians as well as Newfoundlanders took part in the lobster industry.

Minerals: forest industries.

Almost all the industries of the island have to do with fishing; the only mining consists of iron-mining carried on in Bell Isle in Conception Bay, where there are rich beds of haematite iron ore, and in Pilley Island in Notre Dame Bay where there are iron pyrites; while copper-mining is carried on at Tilt Cove and Little Bay, and was formerly carried on at Betts Cove—all of which are on the shores and creeks of Notre Dame Bay. Such asbestos and oil as have been found, near Port-à-Port and Parson's Pond respectively, are close by the western coasts. When we reflect what a leading part mineral development played in driving people inland in South Africa, Australia, New Zealand (South Island), British Columbia, and elsewhere, we may well marvel that the only effect produced by this cause in Newfoundland has been to make men cling more closely than ever like limpets to their rock-bound coasts.

The Anglo-Newfoundland Development Company acquired a vast concession for cutting timber and wood in the valley of the Exploits in 1905, and proceeded to build a small model town at Grand Falls on the Middle Exploits with reservoirs, dams, paper-mills, and machinery, for the purpose of dealing with these concessions. Some tiny hamlets have grown up by the side of the railway, but Grand Falls is the only inland town in Newfoundland. In 1910 the exports of pulp and paper, if added to the exports of lumber, raised this industry to an equality with the iron-mining industry, almost at one bound. What this meant to Newfoundland can only be gauged by studying the relative values of the different industries which are given elsewhere. In reading the statistical tables it should be borne in mind that almost all that is produced in Newfoundland is exported to distant countries, and that almost all its first necessaries of life are imported into it from countries near to it in blood or distance or political association or in some or all of these qualities.

Communications.

A railway was built at the close of the nineteenth century from St John's northward to the Lower Exploits River, westward thence to the Bay of Islands, and southward thence to St. George's Bay and Port-aux-Basques near Cape Ray. In 1913 it had two completed branches to Carbonear in Conception Bay and to Placentia in Placentia Bay, and various branches which were in course of completion to Fortune, Trinity, Bonavista, and Bonne bays, and to Trepassey near Cape Race. The apparent object of the railway is to connect St. John's with Port-aux-Basques, which is the port from which steamers start for Sydney in Cape Breton Island. Instead of connecting these points directly it more than doubles its course by wandering round the body of the island (excluding Petit Nord). The reason for this circuitous course is that if it left the coasts it would pass through solitudes and therefore it keeps as near as possible to where passengers may be served, and skirts the heads of the great bays—Trinity, Bonavista, Notre Dame, St. George's Bay, and Bay of Islands, where the country is principally settled. The roads of the island are fair in the neighbourhood of large towns, but are very rough elsewhere.

Political questions: the fisheries.

The political questions which agitated Newfoundland since it became a colony or self-governing dominion with a resident governor and council, have all turned on questions of such burning interest as the great questions of cod, herring, and lobster. Indeed, at one time these questions almost set Europe and North America on fire. Ever since 1839 French as well as British cruisers patrolled the treaty shore in order to protect the fishermen of French and British nationality. As the French fishermen exercised the drying and curing part of their business on dry land, and as British sovereignty was admitted by the Treaty of Utrecht as paramount and exclusive over the whole island, it was difficult to reconcile the actions of the French naval officers with the principles of international law. The settlers of Newfoundland and their government resented the presence of the French and their claim to govern themselves and control Newfoundlanders on soil which was British ; and they tried to subject the intruders to colonial laws, but without success, because the colony or dominion had no executive where it had no electoral district, and when the treaty shore was divided into electoral districts and had an executive, the executive was too feeble for the purpose. From year to year, the naval officers of both nations patched up temporary compromises by means of some *modus vivendi* more or less distasteful to the Newfoundlanders, and peace was maintained. At last in 1904 the old treaty rights which had been conferred by the Treaty of Utrecht and renewed from time to time by subsequent treaties, were bought up by the British from the French Government, in consideration mainly of certain rectified boundaries in Central Africa ; and Lake Chad came to the rescue of the remoter outposts of Newfoundland. Since that date the treaty shore became wholly British territory, free and discharged from French easements. But it was still subject to American easements. Easements of a less vexatious character than the French easements had been bestowed on the United States of America or its citizens in 1818 as a sequel to what is known as the Canadian war of 1812. These easements did not include drying rights on the shores of Newfoundland except on unsettled parts of the south coast ; and the whole of the south coast was settled in or before 1850. Moreover, American fishermen had no preference over Newfoundland fishermen, like the preference which the Declaration of Versailles accorded to Frenchmen. But the American convention contained ambiguous reference to bays and coasts and creeks and shores, to cod caught ‘ on the shores ’, and to ‘ fish ’. It was partly owing to these ambiguities and partly owing to the refusal of the Americans to be bound by colonial laws for the protection of the fisheries, and for prohibiting Sunday fishing and the like—on the ground that colonial laws could not qualify treaty rights—that disputes occurred between Newfoundlanders and the men of Massachusetts; and on one occasion the Imperial authorities, by Order in Council made in exercise of the powers of the Act of Parliament relating to these fishing easements (1819), annulled a Colonial Act which infringed the treaty rights and appeared provocative (1905). Various arrangements were substituted from time to time for the treaty rights, and after three-quarters of a century of negotiation and of actual conflicts between British settlers and American fishermen, the question was referred to the Hague Tribunal for decision by arbitration (1907) and the decision was given in 1910. The decision, among other matters, held that local laws bound American citizens, unless they were unreasonable or *mala fide*, and that the United States vessels while exercising their rights were bound to report at custom-houses or to customs officials when facilities existed. Bays were also defined, and other ambiguities were satisfactorily explained. After the close of these disputes the fisheries of Newfoundland ceased to embroil two continents; and these absorbing topics of political excitement ceased to interest Newfoundlanders, who resumed their peaceful pursuit of the never-failing cod, herring, lobster, and seals.

Other political questions

The only other events and accidents which diverted Newfoundlanders from their devotion to the sea, and threatened to divert them from piscatorial to political pursuits, were connected with terrestrial pursuits, but resulted only in turning them towards Canadian or English capitalists and away from the American capitalists whom they had trusted. In 1852 a company was created to build a telegraph from St. John's to Cape Ray. It was financed by Americans of New York, who failed before its completion and caused wide-spread ruin. Then Cyrus Field of New York formed another company, which completed the line to Cape Ray, and laid one cable from Cape Ray to Aspy Bay in Cape Breton Island (1856), and a second cable from Valentia in Ireland to Bull's Arm in Trinity Bay, which he connected with the telegraphs of Newfoundland (1858). Newfoundland was now a link in the chain which held Europe and North America together. Sir Charles Bright was the principal engineer of this great enterprise, and the capital with which it was achieved was English. After three months' success the cable failed, but the men who made it were undaunted. In 1865 a new company was formed, with English capital, and two new Atlantic cables were successfully laid from Valentia to Heart's Content in Trinity Bay (1866), and were shortly afterwards extended to Placentia and St. Pierre Island and so to North Sydney in Cape Breton Island. This new enterprise proved a permanent success. Similarly, in making the semicircular railway which has been mentioned, American financial companies undertook the task during the eighties and failed, after which Mr. Reid, a Canadian capitalist of Montreal, continued the task and succeeded in the nineties. He and his company, the Reid Newfoundland Company, also undertook to run passenger steamers plying between points on the coasts of or belonging to Newfoundland, the passenger steamers between Great Britain or Canada and Newfoundland being Scotch or English. In 1894 there were only two banks in Newfoundland and they were American. In 1894–5 both failed. The colony proposed to join the Dominion of Canada for financial reasons. But the financial terms of union proved unacceptable ; the Bank of Montreal came to the rescue of the colonial finances ; and the banks upon which Newfoundland relied were thenceforth Canadian instead of American. Branch Canadian banks were afterwards opened at Harbor Grace and at Birchy Cove (in the Bay of Islands). The moment for political union slipped by ; and Newfoundlanders returned once more to more congenial pursuits and showed no disposition to encourage a relapse into political idealism. Consequently the waves of political excitement in 1895–6, like those other waves of political excitement which have been discussed, subsided and died a natural death or were lulled to sleep. Once more men said *Revenons à nos morues*. No other dominion or colony resembles Newfoundland in its economic conditions, and in politics it may well remain a thing apart and an exception to the modern tendency to sweep dominions and colonies into large groups.

Local government.

Local government in Newfoundland is in a rudimentary condition. Until 1888 there were no municipal institutions in the colony, but the local affairs of large towns were delegated to water companies or the local road boards which will be presently described. Amongst other duties entrusted to the water companies, sewerage and drainage were usually included; and in the capital city the functions of a local road board were discharged by the governmental board of works, which also supervised the roads of the colony elsewhere, and in St. John's enforced the provisions of various Acts prohibiting wooden buildings, prescribing lateral streets as 'firebreaks', and the like.

The first St. John's town council was created in 1888, and the first purely elective council was created by a law of 1902 which was still in force in 1913. The municipal council of St. John's consists of a mayor and six town councillors, all of whom hold office for four years. As the council was the lineal descendant of water companies, its principal duties are to control the local water-supply, sewerage, and drainage. To these fundamental duties are added the duties formerly discharged by the road board or the board of works—such as the duties of maintaining and lighting streets, and of applying the building regulations laid down by the legislature, and, lastly, such miscellaneous matters as the care of parks, the building of baths, and the regulation of cab-fares.

Certain duties usually performed by municipalities are conspicuous by their absence from this list. Nothing is said about the police or constabulary, which the central government controls. There was provision for a volunteer fire-brigade in one of the earlier Acts, but not in the Act of 1902, which only prescribes contributions of about £2,500 per annum towards the cost of the fire-brigade which the government organized in 1893 or shortly afterwards. Electric tramways are confided not to the town council but to a public company which was formed by Messrs. Reid in 1896, and pays to the council licence fees and a percentage on its earnings.

In order to carry out its functions the town council of St. John's is authorized to levy water rates, sewers rates, and other rates on owners and occupiers. Rates are leviable in respect of vacant land, and also on vessels entering or clearing at the customs-house.

The council also taxes insurance companies, banks, gas and electric lighting companies, hawkers, auctioneers, moneylenders, non-resident collecting agents, hired horses, vehicles, theatrical and athletic entertainments, and every public and quasi-public ' billiard-table, sippio-board, and bagatelle board '. The central government also collects and pays to the council coal duties, local Crown rents and sums for lighting and cleaning the town, and the amounts annually voted as road and similar grants in respect of the area included within the municipal boundaries. Special legislation has also been enacted to provide for the towns of Harbor Grace, Carbonear, Placentia, Heart's Content, and Twillingate; but they are still indebted to water companies, electric companies, and the like for the elementary necessaries and conveniences of municipal life; and St. John's is the only municipality in the colony.

Inside as well as outside towns, the government annually appropriates a certain proportion of the proceeds of general taxation towards roads, bridges, and ferries. There are no local rates for these purposes, although the central government delegates the administration of the funds which it appropriates to the use of any district to the local boards for that district. Electoral districts being the only recognized sub-divisions of the colony, the road board districts either coincide with the electoral districts, or consist of divisional sections carved out of them by the governor in council in pursuance of the Local Affairs Acts, 1898 et seq. The boards are or may claim to be elective, but they have no power of imposing rates or taxes and derive their revenue from the sums annually assigned to them by the Public Service Act, or, in other words, the Appropriation Act of the year. The defects of this system may be best illustrated by taking

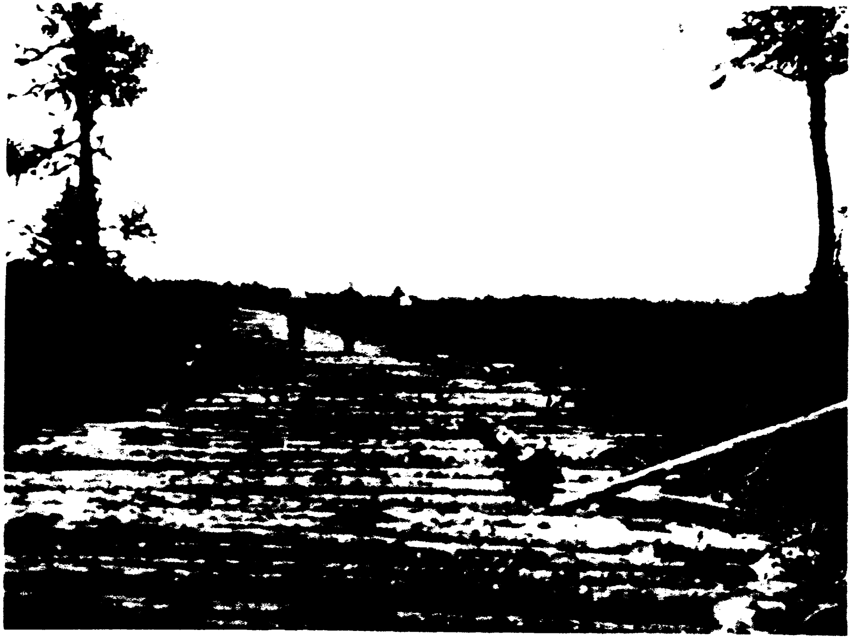

PLATE XXIII. NEWFOUNDLAND: CORDUROY ROAD CROSSING MARSHLAND

Anglo-Newfoundland Development Co.

PLATE XXIV. RED INDIAN FALLS, NEWFOUNDLAND

(Anglo-Newfoundland Development Co.)

as an example the Public Service Act for 1912. The whole statute-book for 1912 occupies a little more than 200 pages of which no less than 150 pages are dedicated to the intricate details of this one Act. So far as roads, bridges, and ferries are concerned, it provides in the first place that about £14,000 shall be allocated to the 18 electoral districts proportionately to their population, these sums being paid to the road or local boards without any direction as to how or where they shall be applied. Next the Act specifies some 145 items aggregating £13,500 or thereabouts and allocates each item to a certain main road or section of a main road which it describes. Next some 120 ferries, which are elaborately described, are designated as the recipients of various sums whose total amount is about £3,500.

Similar detailed appropriations are made by the same Act with regard to local constables, all of whom look to the central authority for their salaries, which are sometimes barely £10 per annum. Similar details, too, occur with regard to the expenditure upon poor-law relief, salaries of £4 and upward being made payable to some 60 relieving officers. Poor-law relief is included under the heading of public charities, and public charities include also items under the control and management of the central authorities—such as the lunatic and poor asylums, the lazaretto, and the general and fever hospitals at St. John's; and include subscriptions to self-dependent, self-regulating institutions like the Church of England, the Roman Catholic and the Deep Sea Mission orphanages, the Irish Benevolent and the St. Vincent de Paul Societies, the Halifax blind, deaf, and dumb institutes, and the Salvation Army rescue homes in St. John's, the Dorcas Societies elsewhere, and the hospitals in the north; but it also includes items capable of being applied by responsible units of government, and sums so applicable may, notwithstanding these minute specifications, be paid direct to the local boards or council (if any) of the place in question. Thus, what were originally road boards have been invested with the rights and duties of administering charitable and poor-law relief; and a system of general local self-government is seen in an inchoate stage of development. The stage is only inchoate, for it must be borne in mind that local levies for local services are unknown, that there is no local financial authority for raising as well as spending money; and that from the point of view of expenditure, all these payments for local services are regarded as part and parcel of the expenditure of the central government. The total sums voted by the central government for roads, bridges, and ferries amount to about £38,000; and the sums for charities amount to about £74,000, the total estimated expenditure provided for by the Public Service Act being approximately £430,000. But several sums are not provided by this Act, which is annual: notably a sum of £64,000 which is set apart for education by the Education Acts, which are not annual Acts.

Education.

The most interesting branch of local government in Newfoundland is education; but here the metaphor of branch is hardly appropriate, as the educational bodies are independent tree-trunks, whose growth the central government only stimulates. Under the Education Acts (1903 et seq.) fees of one dollar (4*s.* 1*d.*) per child are payable but are rarely paid, and almost the entire cost of education is borne by the central government, which distributes its payments for educational purposes amongst the various religious bodies in proportion to their relative numbers. In 1912, out of 1,070 schools, the Church of England owned 352, the Methodist Church 335, and the Roman Catholics 325 schools; and the next most numerous schools were those of the Salvation Army which were 58 in number, although 12 years previously there were only 2. These figures, which include some 7 or 8 denominational colleges and academies, give a total of one school for every 220 inhabitants, and for every 47 enrolled pupils; and it might be thought that these figures should suffice for all needs. But some of the schools are only open half the year; overlapping often occurs; and the clefts and serrations of the coast-line, and the great number and small size of the hamlets and villages by the sea add enormously to the difficulty of providing education for all who need or desire it.

For the purposes of education the principal Education Act of 1903 divided Newfoundland into 53 Church of England districts, 69 Wesleyan districts, 43 Roman Catholic districts, 5 Salvation Army districts, and 2 Presbyterian districts: but the numbers and names of the districts have been slightly increased or varied since that date. Each district has a board, of which the senior minister of the denomination is, as a rule, chairman. As a rule, each district contains several schools; and different denominations preside over the same, or what is practically the same, district. Churches—not the State—created these districts in accordance with what they regarded as the religious demands or facilities of the neighbourhood; accordingly these districts do not coincide with, or dovetail into, the electoral divisions of the colony. Nevertheless, like the electoral divisions, the educational districts are described in language which almost always savours of the sea, and lie for the most part between adjacent coves or bays or harbours. It is hard to suppose that in any colony except Newfoundland a parallel could be found to the language of the Education Act of 1903, which in one of its sections allots certain sums to educational boards 'in districts other than St. John's', and translates this phrase in the marginal note to the section into 'special grants for outports', as though every district were a port. Although the educational districts violate the principle that Newfoundland is a country divisible only into electoral divisions, it illustrates the principle that its divisions are marine and are defined by reference to salt water.

There is no co-ordinating educational authority, no minister of education or educational department of state; and each important denomination has a superintendent of its own. A question put forward by one of these superintendents may be recorded in illustration of the system or want of system which prevails: 'Is it essential that Anglican statistics should be compiled in an Anglican office and all Anglican allocations of government grants certified by Anglican hands ? ' Book-keeping, statistics, supervision, and inspection are carried on not in one office but in four or more offices by the representatives of the interested denominations, so that information on any point which may arise in any year must be sought in the two Roman Catholic, the three Anglican, the one Methodist, and the one Salvation Army report for that year. Elementary education aims at being universal and at covering the whole field, but although national payments promote, no national institution secures this result. Education is headless, or rather leaves the denominations to provide themselves with heads of their own hue or colour in the hope that by these means some substitute for or semblance of a national system of education may be evolved.

Uniformity of study and standard is secured by passing scholars through certain grades, and submitting them to examinations conducted under the auspices of the Council of Higher Education. Each denomination has one or two colleges at headquarters ; and here the keenest contests of the year take place, and the excitement is intense as to whether the Rhodes Scholarship, which is the coveted distinction of the year, shall fall to a student at Bonaventure College (Roman Catholic), Bishop Field College (Anglican), or the Methodist College at St. John's. Teachers' conventions, the massing together of all schools in a neighbourhood on Coronation or Empire Day without distinction of denomination, are also occasionally employed as means for promoting unity ; and Arbor Day or a day for tree-planting, boy scouts and the use of Nelson shields as prizes—these shield being made of copper taken from Nelson's flagships *Victory* and *Foudroyant*—lend a significant tone to the lighter sides of life at the elementary schools. At Grand Falls the Anglo-Newfoundland Development Company have provided a school building ' magnificent in all its apartments ', according to the official report, where children of different

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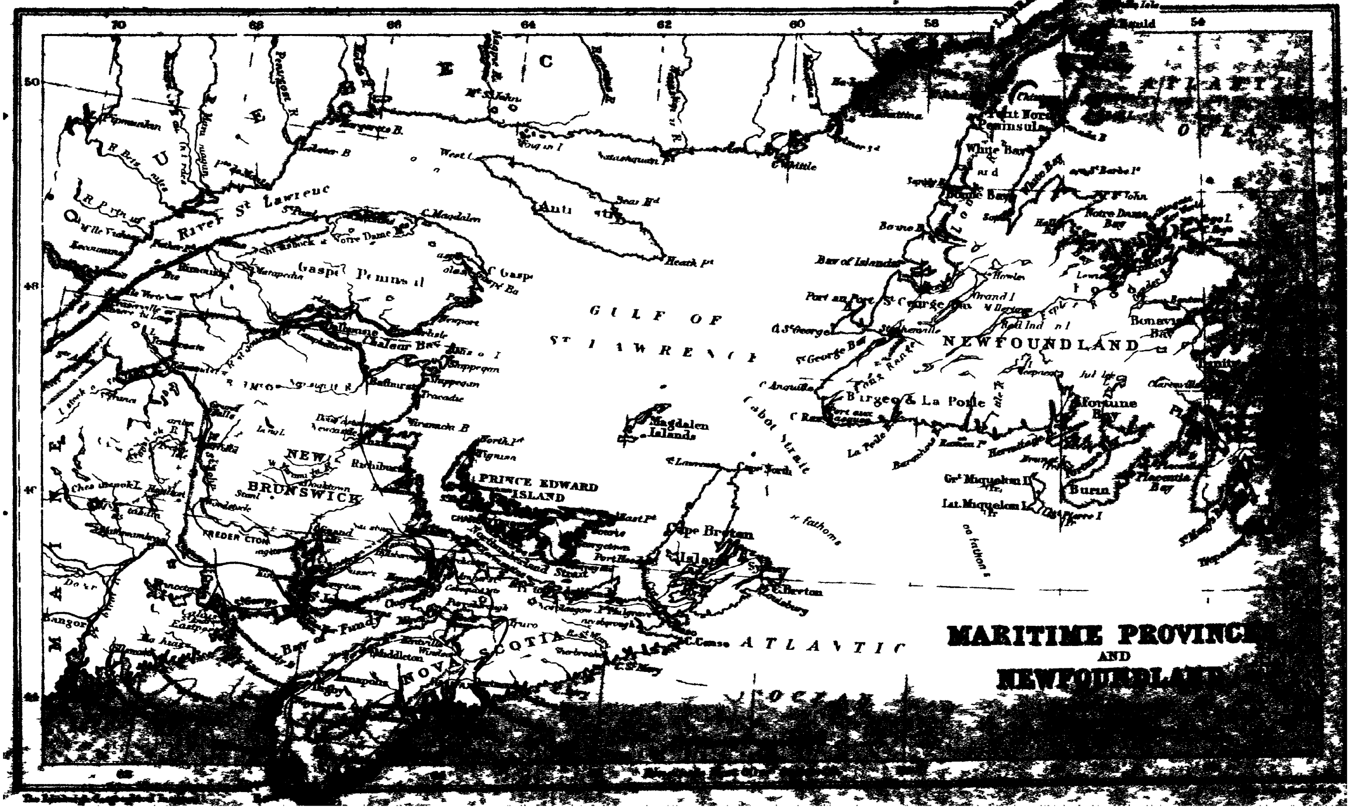
MARITIME PROVINC
AND
NEWFOUNDLAND
LABRADOR
GULF OF ST LAWRENCE
NEWFOUNDLAND
NEW BRUNSWICK
PRINCE EDWARD ISLAND
NOVA SCOTIA
ATLANTIC OCEAN
QUEBEC
MAINE
Anticosti
Magdalen Islands
Cape Breton Island
Cabot Strait
Gaspe Peninsula
River St Lawrence
Chaleur Bay
Bay of Fundy
Northumberland Strait
Bay of Islands
St George Bay
Notre Dame Bay
White Bay
Bonavista Bay
Fortune Bay
Placentia Bay
Burin
Burgeo & La Poile
Gt Miquelon I
Lit Miquelon I
St Pierre I
Petit Nord Peninsula
C Ray
C Anguille
C North
C Breton
Sydney
C Canso
Truro
Bangor
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Protestant denominations pursue their studies through every grade; and a somewhat similar establishment has been provided by private benefactors at Bishop's Falls. But these are exceptional cases, and, as a rule, the schools conducted by the different denominations remain distinct, and are united only by a common scheme of public examinations and study.

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CHAPTER XI

LABRADOR

BY DR. WILFRED T. GRENFELL

Position and area

THE area to which the name Labrador applies is generally understood to be the whole peninsula between the Atlantic Ocean, Hudson Bay and Strait, the Gulf of St. Lawrence, and an imaginary line drawn from the bottom of James Bay to Mingan. This area is mostly attached to Quebec Province, and, as such, is called by many Lower Quebec, to distinguish it from the east coast section which belongs to Newfoundland. The boundary line between these sections is still a matter of dispute. The wording of the grant of the eastern part of Newfoundland cannot be adhered to literally, for while it grants the Atlantic seaboard to Newfoundland, the line laid down was intended to follow the height of land from Cape Chidley till it meets the line drawn due north from Blanc Sablon. This is the view taken by Sir William MacGregor, G.C.M.G., who spent part of two summers surveying in those districts. It is claimed that the total area covers 500,000 square miles.

Apparently, though there is really little known about the country, it acquired its name in the fifteenth century, from a slave on a ship from the Azores in whose honour it was called the 'Laborer's Land'. It most honestly deserves the title, for it yields nothing but to hard work, though as such it is valuable, if only as a nursery for a hardy and resourceful people.

Climate. Labrador lies between the latitudes of 60° 30′ N., and 50° 30′ N., practically the same as England and Scotland. Yet its mean temperature is that of Northern Alaska, which lies between 60° and 70° N.; while the North Cape of Norway, which is in 71° N., and well inside the Arctic Circle, is warmer than the southern boundary of Labrador. The cold current coming from the polar sea through Fox Channel and Davis Strait sweeps its entire coasts. The rainfall and winter snows are by no means excessive, being considerably less than in the British Isles. The coast is beset all the year round by numerous icebergs, ever drifting south with the current. These are born in Greenland, where the pressure of the ice-cap forces the glaciers on till they break off and float away in the south-easterly current. They are the only contribution which that country confers upon Labrador. The surface of the water, warmed directly by the sun, undercuts these enormous masses; tons fall off, the equilibrium is upset, and, rolling over and over, a berg will at times break up in a few minutes. When, however, the floe ice of winter prevents the direct rays of the sun from reaching the water, the icebergs drive farther and farther to the south, and in the months of March, April, and May may be very dangerous to shipping.

Frost. Labrador has an Indian summer of four months. The snow disappears from the land in May, only remaining in the crevices and mountain coombs. There are no peaks which remain snow-capped all the year round, and there is only one small glacier, situated in the Torngat Mountains near Cape Chidley. The days in summer are long and warm, but the nights are cold, and the seaboard is always liable to summer frosts. With every mile of distance from the coast, however, this liability decreases, and at the bottom of the long fiords and in the valleys of the rivers four good frost-free months can be counted upon. Yet, beginning in November, all the rivers freeze over and remain solid for fully six months, while for two more they will be blocked now and again according to the direction of the winds, which carry in and out the broken sea-ice made in the north, till the heat of June and July has melted it. Fortunately the westerly winds largely preponderate, and an ice 'jam' is unusual after July 1. The liability that early gales, occurring about the equinox and before the winter cold has again fixed the ice in Fox Channel, may break up and carry along a quantity of ice into Hudson Strait and block it, has been discussed as a difficulty in the way of the proposed route for conveying grain from western Canada to Europe by steamers.

Temperature.

The cold in Labrador is never extreme; on the prairies of the west a temperature of 50° or even 60° below zero is by no means common, while even at Cape Chidley no temperature below 40° has ever been recorded. Moreover, the general idea of an arctic night in Labrador is entirely erroneous; the length of the days and nights, and the diurnal variations of temperature are to all intents and purposes those of Great Britain.

Tides and storms.

On the east coast the tides are practically negligible, having a range of only six or seven feet, and changing at times on the surface with the direction of the winds. In Hudson Strait, however, they are exceedingly dangerous. There their range is from thirty to forty feet in the springs, where, running at a speed of six knots an hour, they cause nasty overfalls and races. In the Bay itself, also, the tides have considerable range, but they do not affect the deep eastern side as they do the western, which is always shallow and flat. In the Strait of Belle Isle the current never exceeds three knots, and changes its direction every three hours after full and low water. While Labrador is occasionally visited by cyclonic storms, they are no worse than those which occur further south, and are by no means as frequent as is generally supposed. Thus, gales which have done really serious damage to the fishing fleets are usually as much as ten years apart; such a storm occurred in 1908. Tornadoes and hurricanes are unknown.

Aurora Borealis.

An unusual phenomenon, probably better observed in Labrador than anywhere else, is the Aurora Borealis. In the spring and fall the sky is often brilliantly illuminated for night after night. There is not a great amount of colour in the display, and the flashing beams so strongly suggest the movements of vast hosts of spiritual beings, that the Eskimos have called it 'the spirits of the dead at play'. At other times the varied colours of the spectrum are plainly visible, and suggest the serried ranks of gaily uniformed armies marching across the vault of heaven.

Physical features: elevation and rivers.

The Labrador peninsula consists of an ancient plateau of crystalline rocks, which was elevated above the sea in early geological times. The height of land runs from the North Atlantic Coast inland, till about two-thirds of the way down the coast it is fully 300 miles from the seaboard. It then slopes gradually to the Gulf of St. Lawrence, and still more gradually to the west and north-west coast. There is only one river of any size which runs toward the east. This is known as the Grand River, and drains many hundreds of miles of lakes on the surface of the central height of land. It finally breaks through the mountain range in a wonderful fall known as the Grand Falls. They were practically discovered by John McLean, a factor of the Hudson's Bay Company at Ungava, who every year journeyed overland to Hamilton Inlet for his mail. The Falls at one leap are nearly twice as high as Niagara. The circular basin into which they jump has a diameter of about 200 yards, all around which rise steep rocky walls about 500 feet in height, while the spray rises in a continual column to a height of 1,000 feet. The Indians dread and keep away from the spot, regarding it as the abode of the Manitou. The marvellous gorge running for many miles below it is named Bowdoin Canyon. The whole undoubtedly forms one of the foremost scenic attractions of the world. Other rivers which flow towards the east are the Kenamou, Northwest, Fraser, and Eagle rivers. There are many others, but as all of these have their origin east of the height of land, none is very large. It is estimated that one-fifth of the whole of Labrador is covered by freshwater lakes. It is possible to enter the Manicouagan River at the Gulf of St. Lawrence, canoe 300 miles to Summit Lake, cross the lake, and canoe down the Koksoak River 400 miles to Ungava Bay. On the other hand, it is possible to travel by canoe 150 miles from the coast to the Hamilton River, thence 600 miles west, then by a short portage to Big River, and thence 700 miles to Hudson Bay. No country in the world can be covered by boat with so few portages.

These rivers contain many fish. The game ouananiche, or land-locked salmon, keeps to the rapid water; brook trout running up to many pounds in weight are taken with great ease on fly or bait, while numerous white-fish will also rise to the artificial fly.

Fiords.

Almost every river runs out into a fiord, while the entire east coast is split up into an archipelago of islands and inlets, so that natural harbours abound. So much so is this the case, that there is hardly a place along the whole coast where anchorages are more than five miles apart. There are about thirty main fiords, which vary in length from 30 to 130 miles, Hamilton Inlet, Sandwich Bay, and Lewis Bay being the largest. At Nain, in 57° N. lat., and for a hundred miles on each side of it, lies a belt of twenty miles of islands.

Marine conditions.

The temperature of the sea-water never rises above 45° in summer, while it grows colder at every successive fathom down, till at 100 fathoms it will register below the freezing-point.[1] The sea-bottom, after falling to a depth of 200 fathoms, runs off many miles seaward, only sinking to rise again 150 miles off shore into banks covering some 6,000 to 7,000 square miles. On these, immense quantities of infusoria, or small animal life, carried by the polar current, and called arctic slime, maintain large numbers of fish. To these banks many fishermen resort for halibut and cod, while the same slime, carried in along the shore, maintains innumerable small fish, and in pursuit of these come the cod which have made Labrador famous.

Geology.

The geology of Labrador has not yet received the attention which might have been expected. The scanty covering of the land by vegetation, and the unusual absence of rock débris, leave the rocks themselves so exposed that Labrador affords a most attractive field to those interested in the problems of the earth's formation. The formations now in existence are practically all crystalline or Archaic, chiefly syenites and gneisses. Professor Daly, of the Harvard Institute of Technology, describes them as the very earliest foundations of the earth's crust, and calls them the 'Archaic Basement Complex'. The northern cliffs are everywhere marvellously marked by outcrops, through the superincumbent masses of crystalline rocks, of jet-black trap. The strange tracery of the zigzagging fissures, now filled with solidified matter, has plainly written the story of the resistless forces of the molten under-earth. In one region only, but there abundantly, are found deposits of the iridescent feldspar known as Labradorite, which gives such perfect colour reflections when polished transversely to the lines of cleavage.

Mountains.

The mountain ranges of Labrador appear to have arisen from pressure which crumpled the surface from Cape Chidley to Hamilton Inlet in a north-east and south-west direction, and from that to the Gulf of St. Lawrence west and east. The three main ranges or spurs of the central plateau reach the coast in the region of Port Manvers, Cape Mugford, and Ryan's Harbour. The southernmost group, called the Kiglapeits, or dog-toothed mountains, are the Sierras of Labrador. They are about 3,000 feet high: Mount Thoresby, which directly overhangs the sea, is 2,700 feet in height. The Kaumajet, or shining-top range, is 500 feet higher, the summit of the Bishop's Mitre, also on the seaboard, measuring 3,500 feet. This mountain, like the lofty island of Nannuktot, or White Bear Island, was also an island not long ago. A narrow raised beach alone now unites it to the mainland. These ranges, like all the land to the south, have been entirely submerged under the ancient ice-cap. The result is that the same pressure or friction which scooped out the valleys of the east coast, and was exerted in a west-to-east direction, has flattened their summits and levelled off their peaks. With the northernmost range, however, this has not been the case, and the Torngats, or 'Devils', as the range is called, still possess Alpine crags and 'arêtes', which add immensely to their beauty. These last are undoubtedly the highest; and over the Iron Strand, and above the magnificent fiord of Nakvak they rise over 4,000 feet; while it has been reported that in the region known as the Four Peaks, some 40 to 50 miles inland, the mountains are 6,000 to 7,500 feet above sea-level. This at least is true—that the cliffs and peaks of northern Labrador are the finest on the whole east coast of North America.

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[1] These deep temperatures are not uniform, patches of warm water occurring in places at considerable depths.

To-day nothing remains of the old ice-cap, with the possible exception of a small glacier near Chidley discovered in 1907 by Mr. Edward Bryant, and in summer even the highest peaks are bare of snow. Professor Daly has suggested that the Grinnell Glacier of south Baffin Land is another persistent vestige of it. Every evidence combines to show that the north-east coast is gradually rising, and the east coast more rapidly than the west.

Disastrous forest fires which have occurred since the white occupation have disforested over three-fourths of the country, and destroyed the vegetation and the covering of the soil, in many places leaving nothing but rock.

Population: Eskimo.

From the physical constitution of the country we naturally turn to history of man's connexion with it—a relationship which is still dim and uncertain. The original inhabitant was undoubtedly the Eskimo, but whence he came is as yet unsettled. It is generally supposed that he was once a Mongol inhabitant of northern China—that he was driven north by the pressure of humanity, and at last wandering over by the Aleutian Islands, he travelled round the polar sea until he reached Labrador. From thence he is supposed to have journeyed on to Greenland. This view is supported by much evidence, especially the similarity of language which would still enable a Greenland Eskimo to understand one from Alaska; a similarity of face, particularly the almond-shaped eye, and also the small stature, though the Eskimo of the Herschell's Island region are considerably taller. The earliest accounts, however, locate the Eskimo in the Gulf of St. Lawrence as far down as Anticosti, and also in Newfoundland. They are to-day a simple, stolid, inoffensive people, and seem always to have possessed these characteristics. They readily made treaties with the whites, which, however, the latter most ruthlessly and murderously broke. It is true that murders of those who tried to steal their country have been recorded against them, and they have been described as murderous savages, but retaliation, and not natural cruelty, has been the cause of it. The barbaric treatment which they have received at the hands of successive white and red visitors of every kind, inclusive of New England fishermen and white traders, was sufficient to drive them to any measures which would commend themselves to an animal at bay. Once they extended as far south as St. John's River, but the white man has driven them back till now there are none south of Hamilton Inlet.

Indians.

Besides these shore-dwellers, who roughly number now 3,500, of whom 1,500 are on the north-east coast, there are about the same number of true North American

Indians. All these are of Algonkin stock, evidences of whose former occupation extend from the Mississippi to Hudson Bay and the Atlantic Ocean. The southern Montaignais can still talk to the Nascaupies of the north and east, though in the south they are now much mixed with white blood. It was the Iroquois, after the French settlement, who drove the less warlike Crees into the cold and barren region, and practically the whole of the interior of Labrador is still their hunting ground.

Both aboriginal races are steadily diminishing in numbers. Somehow the Indians manage to exist by their hunting, living on fish, berries, and game. But, as a rule, they visit their reserves on the Gulf shore once a year for supplies, generally about June or July, or else they seek the Hudson's Bay posts at Ungava, Davis Inlet, or Whale River. These are their festive seasons, for in September they must return by long and wearisome river journeys to their own hunting grounds, more especially as the game has become greatly depleted. Only an ever-disciplined race could exist at all, and even so their mortality foretells their extermination.

There is a fine virile variety of Indian in the north-west who occasionally trade at Fort Chimo. They look down somewhat on the Nascaupies, a name which probably means 'weakling', though the race call themselves Nenenot or 'the ideal people', just as the Eskimo call themselves Innuit, or 'the people'. The whole number of the Indians are sometimes called mountaineers, or Montaignais Indians. In the south-west is yet another branch of the Crees. They trade between Mistassini and Nichicum, a Hudson's Bay post in lat. 53° N., on a lake of that name, and now the only inland post of the whole interior. The unit of value used to be the beaver, but until recently trade was largely irrespective of prices, the general principle being to keep the families whether they caught much or little. In spite of this, however, starvation of whole families was by no means unknown, especially when periodically the rabbits failed, and the migrating partridge did not return. Each family by custom owned their own hunting grounds, and no family is complete without its keen little hunting dog, which trees partridges and locates bear-holes and porcupines running along the bank. Now, of course, all the Indians use the modern rifle, but for fishing they still employ the wooden spear, the torch, and net of sinew or twine; while they often catch many partridges by a pole with a noose, or shoot them with a spruce bow and arrow, in order to economize ammunition. In the same way, whenever possible, caribou are killed with a spear while swimming in the lakes, and often in very large numbers. The carcasses are left at the place where the animal was speared, to dry in the sun and wind, and are consumed later. In fact, these migrating bands preserve better than anywhere else in North America the features of aboriginal Indian life and customs. In their relations with one another they display unselfishness and other high qualities. Their language is full and expressive, the verbs having nearly the whole burden, and being accordingly subject to innumerable inflections. In the north they are nominally Protestant, in the south and west, Catholic, but they still possess many ancient superstitions, and numbers of them are not yet free from the fear of the Windigo, or big cannibal, that rushes out on the hunter. The spirits are not generally evilly disposed, but become more so as they resemble human beings. The Tshe Manitou, or Good Spirit, is almost unapproachable; and there is a distant conception of the Trinity.

Discovery and development.

The history of Labrador has well been termed a pageant rather than a drama. The country has been a stage across which figures have passed and left no connexion with those that followed. Professor Fernald of Harvard identified the botany of the early Norse Sagas with that of Labrador, but Fridtjof Nansen has endeavoured to show that the entire early Saga stories were mythical. Again, while Antonio Zeno of Venice, John Szkoliny of Poland, and others have claimed pre-Columbian visits to this part of North America, it would seem safer to discredit all of them. The grandiloquent stories of the great town of Brest and the doings of the Sieurs de Donjeon and de Combes, and the whole narrative told by Mr. Samuel Robertson should be placed in the same category, and with them the Arcadian invasion of 1753. However, Bjarni Herjulfson probably sailed west for many days and discovered a land which was high, mountainous, and covered with glaciers. Some claim that this was undoubtedly Labrador, but if so the glaciers were not glaciers. In the year 1000 Leif Ericson, following his steps, discovered Helluland, the land of flat stones. This also has been called Labrador. But the characteristics of Labrador rocks are that there are few loose rocks at all except the numerous ice-born boulders that cover every hillside, and are never flat. In 1121 Eric Gnupsson was appointed Bishop of Greenland and Vinland. In 1824 the following inscription was found on an island off Baffin's Land—'Erling Sighvatson, Bjarni Thorharson, and Eindod Oddson raised these marks and cleared ground on Saturday before Ascension week, 1135.' John Cabot was the real discoverer of Labrador. He believed that he was finding a passage to Asia. It was in his second voyage of 1498, while seeking the wealth of Ormus and Ind, that he struck the Labrador shores. In 1500 Gaspar Cortereal cruised along the best part of the east coast. He succeeded in capturing sixty miserable Indians, whom he carried off to King Manoel of Portugal for slaves; after which, on his third voyage, he disappeared. Martin Frobisher and John Davis both visited Labrador in 1577 and 1586 respectively. In 1670 the famous Hudson passed along the northern coast into the bay. Fish was valuable in those days, and Sebastian Cabot's stories that 'cod sumtymes stayed his shippes' encouraged Norman and Breton, and then Spanish, fishermen to seek the shore. In 1534 Jack Cartier met a French fishing-boat in the Strait of Belle Isle, searching for the port of Brest. Remains of Spanish stations were still visible at Bradore in 1704. It was not until 1763 that the English fishermen really came out.

In 1661 the Compagnie des Indes granted to one

François Bissot the Île au Cerfs on the Labrador coast 'en Seigneurie'. Jolliet, discoverer of the Mississippi, married one of his daughters, and settled on the coast. He was ruined, however, by the English invasion of 1690, and died forgotten on an island there. In 1702 another tanner, De Courtemanche, obtained a grant to trade and fish in South Labrador. From that time to 1760 many similar grants were made to Frenchmen, who established stations as far north as Hamilton Inlet. So we learn that in 1744 several thousand barrels of cod oil were exported to France. Order was kept on the coast by De Courtemanche, who, as commandant of a port in Bradore Bay called Fort Ponchartrian, had plenty of trouble with Eskimo and fishermen. He was followed in office by his stepson, François Brouague. After the English conquest the French for the most part returned home, and the coast, from Mingan to Bradore, was held by the English Labrador Company, under Matthew Lymburger of Quebec, while Bristol firms built stations at Cape Charles and Temple Bay.

In order to preserve an open fishery for the Dorset and Devon fleet, the Canadian east boundary was now fixed at St. John's River, all the remainder being put under the command of fishing admirals, and united to Newfoundland. But though Sir Hugh Palliser, the governor, built a fort at Chateau to enforce order, such a disorderly crowd (the worst scum from the colonies) sought these fishing grounds that it proved of no avail. The New England fishermen especially resented their exclusion, and it became a lesser cause of the American Revolution. In 1774 Labrador was again handed over to Canada, and in 1809 again given back to Newfoundland. The present arrangement was only reached in 1825, the boundary line being placed at Blanc Sablon River. There could be no better example of the small interest taken by the Home Government in the boundary lines of North America. For the line across the land was to be drawn from Anse Sablon, a place which does not exist, 'to the entrance of Hudson Bay,' a spot which no man has as yet been able to locate, while if the line were really drawn between the points named it would fall largely in the Atlantic Ocean.

The most interesting single figure in Labrador history is undoubtedly Major Cartwright, whose inimitable journals have just been republished in America. His brutality and licence, his piety and real business integrity, are so frankly recorded, and so ingenuously depicted, that one gets an idea of the spirit of the times which is almost unique. Among his other valuable records are those of the catches of salmon in Eagle and Paradise rivers, in numbers which were as great as all those now caught in all Labrador together. This shows that unrestricted netting has seriously depreciated that valuable fishery. Cartwright also formed fishing companies at Forteau and Blanc Sablon.

In 1818 a concurrent right to fish 'on the coasts, bays, harbours and creeks of Labrador' was granted to the American fishermen, just as a similar grant had been made to the French in Newfoundland. As both these countries granted large bounties to their men, the English fishermen felt the competition keenly.

Labrador has only on two occasions been the scene of fighting between Europeans. In 1778 American privateers robbed and destroyed all the fishing stations from the Gulf to Hamilton Inlet. One can scarcely imagine a more pitiable side-light upon the devilry of war. Again, in 1796, three French frigates burned and destroyed all they could find, all the fishing vessels, stores, and supplies, besides razing the small fort at Chateau. The Hudson's Bay Company only sold to the Dominion their 'right to the trade and commerce of Labrador and all lands round Hudson Bay' in 1870, rights which had been proved valid in 1752. In 1831 they founded Fort Chimo in Ungava Bay, and a year or two later Rigolet Post and Hamilton Inlet. They now have posts at varying distances all round the coast, and have lately established one at Cape Wolstenholme, and also at Lake Harbour in Baffin's Land. Others have been deserted owing to the moving of the population and the depletion of game. No book on the country is more interesting than that by their factor, John McLean, called *Notes of a Twenty-five Years' Service in the Hudson Bay Territories*, published in 1838. Messrs. Revillon Frères, of Paris, have three stations in Labrador.

White population. The present white population of Labrador is derived from sources hitherto referred to, French, Jerseymen, Newfoundlanders, a few American Loyalists, and the half-breed population which has grown up around them. To these the Hudson's Bay Company have added many Scots, Norwegians, and English, whom they have brought out as servants and officers, and whose offspring have married and remained in the country. Many well-known Canadians have served their apprenticeship in Labrador.

Industries. The present industries of Labrador are fishing, furring, sealing, and whaling. There are no factories, no constructive work, no conservation. For centuries the country has been just as fully exploited as man could manage, and it is little wonder if, like a pond on a hill-top with no intake, it should show signs of running dry. Sealing. Immense herds of harp and hood seals once visited its coast in the spring and autumn, on their journeys to their whelping ice off the southern coast or in the Gulf, where in the month of March they give birth to their young. Much money was made netting the old seals along the Labrador coast, but now the herds have been so depleted by Newfoundland steamers that it scarcely pays to set the nets. Many poor settlers go short of boots, clothes, and meat as the result. The skins of the young seals are taken off with the fat attached and sold as pelts, fetching about ten shillings apiece and weighing about fifty pounds. The baby fur is fast for three weeks after birth, and for that reason they are hunted and killed while they are still lying helpless on the ice. Their skins are now dyed and used for robes ; they are white when born. The old seals drive them into the water at that tender age, when they learn to swim, and at the same time they lose their baby fur. They now strike out direct for the north and are called ‘ beaters ’, owing to their imperfect gait. They spend the summer in Melville Sound and Baffin's Bay, and return as one year old bachelor or Bedlamer seals. They do not breed till their second year. In their third year they develop a black patch over their back and shoulders, and are known as ‘ old harps ’ or ‘ saddle-backs ’. The hood seals are very much larger than the harps, and are characterized by a large bladder of skin over the nose. This the male can inflate at will, and it gives him not only a most terrifying appearance, but also affords him considerable protection—as, for instance, from hunters who are accustomed to kill their victims by sticking them in the nose with a dogwood pole called a seal bat. The more well-to-do Labrador settlers fished with what were called ‘ frames ’, or a huge submerged room of net set from the shore, with a sunken net door which was hoisted up by a capstan on the land as soon as a school of seals was seen to enter. Poorer men used gill nets with large meshes in which they entangled the seals and drowned them. The seals are often eaten, before they can be taken from the nets, by the voracious ground sharks which abound in these northern waters.

Fisheries.

Cod and halibut are the chief sea-fish. The latter are taken almost wholly with long lines, on the banks which lie 150 miles out in the Atlantic. They are mostly taken by New England men, who have larger and better fitted vessels, and whose protected industry gives them a great advantage over any others. The fish are salted on deck and taken home in bulk, where as a rule they are smoked before being sold. Long lines for the cod fishery are coming more and more into vogue. The old method of hand-lining proved too slow a process, limiting the earnings of a single man to some fifty quintals, or $350 to $400 a year. This led to their adopting nets, somewhat similar to seal frames, called ‘ traps ’. One leader of net set to the rocks bars the progress of the school of cod as they browse along close to the shore. They follow the twine and are led to a room of net with incurved doors, so that as they go round and round the inside, they do not swim out again. The doors are hauled, and then the net floor passed over a boat or boats till the fish are a solid mass in one corner of the surface, when they are bailed into the boat. Seines are also used for cod in suitable localities. Of late years the cod have either learned to avoid the traps, or have been driven away by them. Once ashore, the fish are split, the backbones removed, and the rest salted and dried in the sun for two or more days according to the cure desired. Oddly enough, each market seems to wish a different amount of salt or hardness, and perhaps the most difficult thing in Labrador and the most expensive part of the industry is getting sunshine enough for the process. The principal markets are in the Mediterranean, to which the best of the fish goes. A little is shipped to England, and the balance to South America and the West Indies. The immense quantities of offal, heads and fish remains, are wasted, no way having yet been discovered of remuneratively collecting it for conversion into fertilizer.

Export of cod.

The annual export of cod from Labrador is worth approximately three million dollars, and weighs thirty-five to forty thousand tons. There appears to be a diminution in the quantity taken, and no scientific efforts and inquiries to prevent such a wholesale disaster are being made. The fish is carried to market by small Welsh and Norwegian vessels, which run many risks, and incur many losses on their hazardous voyages. No better sailors exist than the crews of these small and venturesome craft. The price of fish depends largely on the catches made by the French and Norwegians, but of late not only has the price been rising, but new markets have been opened. The salt for the fish is brought from Cadiz and Valencia by the vessels which carry the cargoes home. The business of a fish merchant, however, is far from being always remunerative, as there are a thousand openings for loss and depreciation. Though the fish firms in St. John's, Newfoundland, which handle most of the

Labrador fish, are of very old standing, all have seen hard times, and more than one have been forced to compound with creditors.

Herring, mackerel. Immigrant fishermen.

The herring, for which Labrador was once so justly famous, have almost entirely left. The mackerel have absolutely gone ; but the reason is unknown. Formerly it paid thousands of Newfoundlanders to take passage on schooners going north with the summer fishery, if they were too poor to own vessels themselves, and then, lodging in tiny huts of wood and sods, to fish in punts and small sailing boats from the shore. They returned in the autumn with the same schooners, which were compelled by law to carry them back. But the number of these has been steadily decreasing. For besides a plot of land at home which gave them potatoes and cabbage, they had no second string to their bows, and in the event of getting no summer catch they were left destitute for the winter. So deep-set in these men, however, is the love of the sea, that often they would leave for the Nova Scotian mines in winter, and spend any money left over from their expenses in again returning to Labrador the following year.

Salmon.

The salmon fishery may also be considered a sea-fishery, and the North Atlantic salmon is the finest in the world. The cod traps and the nettings of the rivers have greatly impoverished the catch, and also apparently diminished the size of those taken in the rivers. But in spite of this, excellent fishing for sea trout, brook trout, and salmon is obtainable in all the rivers, at least as far north as Cape Harrison. The bulk of the salmon fishery is now in the hands of the Hudson's Bay Company.

Fur

Labrador fur is especially valuable, owing to its dark colour, though the extensive forest fires which have denuded so much of the land have had a deleterious effect, by the inevitable laws of environment, upon its shade and its quantity. Like everything else in the country, the fur has been badly exploited, and the numbers of immature skins which are seen every year show how little heed men pay to the laws when it does not suit them to do so. The most valuable fur is the black and silver fox—sports of the common red, but sports as capable of perpetuation as the seedless orange or the white blackberry. The farming and conservation of these animals is comparatively easy and very remunerative, and was introduced into Labrador in 1912. It has already proved successful in Maine and Prince Edward Island. The skin of a good large dark silver fox will fetch £400 in the market, and has fetched considerably more, while a red fox will seldom sell for more than £2 10*s*. The patches or half and half variety range up to £10 at most. Another animal altogether, the arctic white fox, fetches up to £3. He is smaller, but very abundant, coming south on the arctic floe ice and breeding in Labrador. The marten cat, or sable, is worth about £6, and is still fairly plentiful in the interior. The mink, mostly taken along shore, realize about £2. Lynx, much less numerous than formerly, have become more valuable, owing to the splendid black dye which they take, and have risen from £1 to £10 in value. Otters, varying from fuzzy brown to shining black in colour, are taken on all the rivers, and fetch similar prices. Beavers are sold by the pound. Owing to their serious diminution, laws against killing them have been passed, but have saved the lives of very few. As soon as any number gather on a river, it is impossible to protect them, for Indian bands succeed in finding customers for them in spite of every precaution. Ermine is numerous though small. At times it fetches 5*s*. a head. The most common fur is musquash. It has greatly increased in value. Black bear, though fairly plentiful, are comparatively of little value, the best skins only fetching £5. It is a long while since the Barren Ground bear has been found in Labrador. A few straggling white bears from the polar sea are killed on the coast every year, as they loiter to catch young ducks and seals on their way north. Wolverine and blue fox are uncommon ; squirrels and woodchucks are numerous, but valueless. The arctic wolf is still fairly common ; he is a cowardly beast, and never attacks man. He is much larger than the Eskimo dog. The latter are really the greatest trouble on the coast, for while they are splendid for transport in winter, they make any kind of garden, or the raising of domestic animals, impossible.

Mammalia. The Labrador mammalia are more numerous than might be supposed. The list published by Outram Bangs of Boston is probably complete. Besides those mentioned above there are many mice, moles, bats, voles, lemmings, and some rats. The arctic hare, which is fairly common, is greyish blue in summer and white in winter. Like almost all the animals of Labrador he assumes a protective colour. The most important, however, of the food mammalia are the caribou. The woodland variety has become very scarce, but the Barren Ground species are still abundant in the north. The ease with which these animals make a living summer and winter, and their marvellous natural increase, though they are unprotected and beset with innumerable enemies, suggested that the immense tracts of land, now quite valueless, might be converted into a huge ranch for reindeer. Experiment has so far only extended to northern Newfoundland. There, however, the climate and conditions are identical. It is in every way justifying itself. The original 300, imported from Lapland, are now a fine herd of 1,200. This is exclusive of 50 sold to the Dominion Government and sent to the Peace River district, and of nearly one hundred superfluous stags killed and eaten for food. The hauling capacity of a deer is equal to that of at least four dogs, but for rapid transport the latter are still preferred, though deer can make a greater speed when they choose. Their milk is rich and bland, but so long as the does and fawns run together it is no easy task to collect much from them. The excellent meat has a flavour between that of beef and mutton. The skins are exceedingly valuable for winter robes.

Among the sea mammals the most valuable, the right whale and the bowhead, are almost extinct. The sulphur-bottom is scarce, and since the establishment of whaling factories on the coast, even the humpback and finback are diminishing in numbers. The sperm whale, or cachalot, is practically only a visitor. The white whale is still common in the north and south, but the walrus and narwhal, once numerous, are now rarely taken off Labrador. Porpoises are still common, as also are dolphins, but it does not pay to hunt them, except for dog food.

Birds.

The birds of Labrador have been carefully listed by Drs. Townsend and Glover, of Boston. Two hundred and sixteen varieties are known at present. The most valuable among them are rapidly diminishing from indiscriminate slaughter, there being no one to enforce the close season regulations. The esculent arctic curlew, which formerly blackened the sky in flocks, is now almost extinct, £10 being offered for a single skin. It is in the States, however, that this bird has been destroyed by the poulterers. Fortunately the Canada goose is still numerous, a fact that is due to his nesting singly and far in the country. The willow grouse and rock ptarmigan are both important food factors, but they are migratory, going north in summer, and their supply in any particular region can never be counted upon. The spruce partridge, owing to his stupidity and confidence in man, is an unusually easy prey, and is rapidly becoming rarer. A large variety of small land birds are apparently attracted every year by the numerous berries that are ripened only by lying on the plants under the snow all winter. The black duck, snipe, teal, and widgeon are the next most acceptable birds for food, but the native eats everything which falls to his gun, and consumes quantities of eider ducks, auk, and even gulls. Besides the Eskimo curlew, the Labrador duck, the American oyster-catcher, and the passenger pigeon are exterminated. Quite a large number of the eggs of ducks, gulls, and auk are still taken in the spring, and preserved for eating during the summer.

Mollusca.

Among the molluscs of the coast clams and scallops are common, but as they bury themselves so deep in the mud, and cannot live in shallow water wherever the bottom is subject to freezing, they are hard to obtain, though excellent for food. The edible mussel also is found along the entire coast, and on these sometimes starving families have had to depend for their existence when the winter supplies have run out, and no new supplies have arrived. The common cockle and the *Astarte*, or little brown clam, are also common. The gastropods are, however, commoner than these bivalves, and various large whelks are a usual adjunct to a Labrador meal. There are many other varieties, of which Mr. Charles Johnson of Boston has written. The list is still very incomplete, however, as little work has been done on them in the field. Land molluscs are comparatively rare. Ot the crustaceans the lobster is the most valuable, but is seldom taken north of Battle Harbour, and only in any abundance to the westward of the Strait of Belle Isle. Over eighty varieties have been listed by Miss Mary Rathburn from various previous lists.

Flora.

The flora of the country has yet to be fully worked out, but Professor Delabarre of Providence, Rhode Island, has done considerable work on the subject. Labrador is the most southerly country which has a predominantly arctic vegetation. It presents an amazing wealth of strikingly coloured flowers, so that in places the land gives the appearance of a cultivated garden. Besides this it has still a quantity of accessible timber—spruces, larches, firs, birches, and balsam poplars. The soil of the country is moist, but cold and rich in humic acid and in salts, all of which facts tend to produce physiological dryness, and nearly all the plants have special protection against this and the drying winds from which they are so poorly sheltered. Thus they have large roots, a stunted or low growth, small leaves, generally thick and recurved with thick cuticle and plain edges. Some store water in the cells of the leaves or stems, and have hairy coverings to prevent evaporation. Owing to the scarcity of insects few of the flowers depend on them for fertilization, the large majority relying on the winds. The magic rapidity of the appearance of flowers when the snow vanishes is due to the fact that to survive at all in such short seasons the embryonic leaves and flowers that are to appear one year are always formed during the previous season. Plants which mature slowly may flower, but cannot seed and persist in the short summer. Those which have berries which are attractive to small animals naturally tend to spread.

Forest belt.

In the forest belt there are altogether nine species of trees. This belt is continuous over southern Labrador between 52° and 54° N. lat., except on the hill-tops along the coast. North of 53° all the hill-tops are barren, and in 55° more than half the country is treeless. North of a line from Hebron in 58° to Ungava Bay trees disappear. The barrenness of the southern islands has given a very wrong impression of the real condition of the country inland, as the valleys of the rivers south of Davis Inlet are all well timbered. The black spruce is by far the commonest tree, though all timber when cut is considered spruce. It affords an excellent fibre for making paper.

Flowering plants and berries.

The lovely white flower of the Labrador tea and the red swamp laurel form most of the undergrowth of the south, while in the north the *Cladonia*, or Iceland moss—a white lichen—covers most of the barrens. Blue campanulas, red saxifrages, fireweeds, yellow ranunculi (American golden rod), blue gentians, the abundant white *Canadensis*, and later on its brilliant red berries, with many other familiar plants, make the slopes of the hills in southern Labrador gorgeous. In the marshes there are many berries. The yellow cloudberry, named locally the bakeapple berry, and largely used for food, is in great abundance in the south. Sweeter, but less abundant, is the red arctic raspberry. Two blueberries, *Vaccinium Pennsylvanium* and *uliginosum*, are very abundant, but the mountain cranberry is of most use, as being far easier to preserve. No Labrador family need suffer from want of vegetable salts, for these berries will keep sweet all winter if simply preserved in cold water. The ubiquitous bearberry is often acceptable, especially in the hot autumn days when the traveller cannot find water.

There are also numberless Boleti and Russulae, which are edible and easily preserved by drying.

The further list of other emergency foods as given by Mr. Thompson Seton might have saved life if travellers were familiar with them, and with methods of cooking them. Such are Iceland moss, reindeer moss, rock tripe, the buds and outer and inner bark of the aspen, and the inner bark of willows and birches.

Insects.

With insects as with plants the numbers of species are comparatively few, though the numbers of individuals are endless. There are, however, probably about 750 species, and unfortunately cold has no controlling effect upon them. The mosquito egg will hatch out in water just above the freezing-point. During July and August the lowlands are scarcely habitable, for where there is still water the mosquitoes breed, and where the water is running, the black fly. Fortunately none of these carries germs affecting man ; indeed Labrador has no endemic diseases. There is no malaria, no leprosy from fish-eating, no harmful tape-worm as in Greenland from the numerous dogs. There are two varieties of bot-fly which make the lives of the deer miserable. One deposits its larvae in the animal's nose, whence they crawl up into its frontal sinuses. The other bot lays its eggs on the hair within reach of the animal's mouth. The deer lick this off, the saliva releases the larvae from their cases, and the deer swallow them. They then burrow through the animal's tissues till they lie just beneath the skin. The writer has never seen a head or skin free from one or other of these pests. At maturity the larva bores out and falls to the ground, where it hatches out into a fly again. The deer-flies and horse-flies are also at times troublesome. They are large buzzing insects resembling wasps. On the Hymenoptera, Lepidoptera, and other insects Dr. Charles Johnson, of Boston, has written at some length. On the Coleoptera Mr. John Sherman, of Brooklyn, is the authority. He has collected over eighty varieties. Over one-third are carnivorous ground beetles, mostly black. There are two water beetles also carnivorous which are peculiar by being seldom found anywhere else but in Labrador. They have power to rise from the water and fly for miles over the country.

Social conditions, &c.

For the white people of the country, except in the west, little or nothing has been done for their mental development along academic lines, though their spiritual welfare has not been neglected. Nowhere in the world will a more peaceful, law-abiding community be found. The truck system of trade and the absence of money as a medium of exchange has kept a large proportion always in debt, and their lot in life has been little better than serfs to their suppliers. Their houses are small and ill ventilated, their dietary is poor and rendered less efficient through the ignorance of the rudiments of domestic science. The absence of resident doctors to enlighten them and afford treatment in case of need piled up arrears of surgery that were formerly pitiful to see. A child born with or acquiring a disability, which in civilization might be easily remedied, was often obliged to pass through life deprived of some invaluable function for earning a living. With no opportunity of making sufficient provision for old age, and no communal institutions, the shadow of probable privation when physical capacities should fail hung over the lives of many. But of late years much has been done to make matters better in this respect. The means of transport have been greatly improved, more especially by the Government of Newfoundland; direct telegraph lines and wireless stations have made communication possible in times of need. The three small hospitals erected at strategic positions some 200 miles from each other by the Royal National Mission to Deep Sea Fishermen have been partially subsidized, and a better system of poor relief and fuller opportunities for the administration of justice have been instituted. Three lighthouses have been erected on the east coast, and a systematic survey has been undertaken.

In the extreme north at the Moravian stations the Eskimo have been taught the three 'R's' and the doctrines of Christianity. Unfortunately, parties of them have been taken to civilization for show at exhibitions, at which they contracted various diseases. This, combined with disregard for and ignorance of sanitation or hygiene, is inevitably and rapidly destroying them. To remove an Eskimo is now prohibited by law.

Economic future of Labrador.

The writer has no doubt that Labrador has a future of economic importance. It will probably yet afford valuable mineral products. Its forests are still of sufficient importance to promise labour as the pulp supply of the world elsewhere diminishes. With proper conservation there is no reason why its fisheries and its fur supplies should not recuperate. Fur-bearing animals can be bred and selected. Its flora that gives a return to man can be improved and added to. There is no question that as a vast reindeer ranch it could contribute a valuable quota to the proteid food supply of the world. But it needs capital, in both cash and intelligence, for its development. If points of call were made in Labrador by steamers plying between Hudson Bay and Lower Canada, if a direct line of steamers to Europe were instituted, if a railway were built connecting the east coast with Quebec, if roads were built along which people could travel, these new factors would soon make great changes in the country.

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THE BRITISH WEST INDIES

INCLUDING THE WEST INDIAN ISLANDS, BRITISH GUIANA, AND BRITISH HONDURAS, WITH BERMUDA.

CHAPTER XII

TOPOGRAPHY, POPULATION, AND GOVERNMENT

BY ALGERNON E. ASPINALL

Topography.

THE islands of the British West Indies form links in the chain of islands which stretches in a semicircle from the south of Florida to the eastern end of Venezuela on the mainland of South America, and encloses the Caribbean Sea. They lie between latitudes 28° and 10° N. and longitude 59° and 81° W. and comprise (1) the Bahamas; (2) Barbados; (3) Jamaica, with Turks and Caicos Islands, and the Caymans; (4) Trinidad and Tobago; (5) the Windward Islands, including Grenada, St. Lucia, St. Vincent, and the Grenadines, and (6) the Leeward Islands, comprising Antigua, with Barbuda and Redonda, St. Kitts, Nevis and Anguilla, Montserrat, Dominica, and the Virgin Islands. The colonies of British Guiana on the mainland of South America and British Honduras in Central America are also generally considered part of the British West Indies, and in the present and two following chapters the insular colony of Bermuda, situated almost equidistantly between the Bahamas and Nova Scotia, will also be dealt with.

§ 1. *The West Indian Islands*

Relief.

With the exception of the Bahamas and Barbados the islands are exceedingly mountainous. Indeed there is every evidence to show that most of them are formed by the mountain ranges of a vast submerged land-mass. Many of the almost land-locked harbours of which the islands boast—and notably those of St. George's in Grenada and Castries in St. Lucia—are undoubtedly the craters of submerged and long extinct volcanoes. From the central ranges of mountains, which are densely clothed with tropical vegetation, spurs run down to the coast, forming valleys of great beauty and fertility. Some of the West Indian islands are scarcely more than single volcanic cones, and of those belonging to England cloud-capped Nevis falls under this category (see further Chap. XIII.).

Harbours. Nature has provided the West Indies with many superb harbours, the most notable of which is that of Kingston in Jamaica, which covers an area of 16 square miles, with a depth of 7 to 10 fathoms over 7 square miles, and the Gulf of Paria, between Trinidad and the mainland of South America, which could easily, it is said, hold all the navies of the world. Other sheltered harbours of importance are those of Montego Bay and Port Antonio on the north coast of Jamaica, St. John's, Falmouth, and English Harbours in Antigua, St. George's in Grenada, and Castries in St. Lucia. Barbados has only an open roadstead—Carlisle Bay; but it is well sheltered from the prevailing winds and affords an excellent anchorage.

Areas. The islands vary greatly in size. Jamaica, with an area of 4,207 square miles, is the largest, while Trinidad, which has 1,754 square miles, comes next in order of size, and then Dominica with an area of 305 square miles only. The areas of the remaining islands are: St. Lucia 233 square miles, Barbados 166, St. Vincent 140, Grenada 133, Tobago 114, Antigua 108, St. Kitts 65, Nevis 50, Anguilla 35, and Montserrat 32. The Bahamas, Turks, and Caicos Islands, the Cayman Islands and the Virgin Islands, cover 4,404, 166, 89, and 58 square miles respectively.

Scenery. It would be impossible to exaggerate the exquisite beauty of the scenery of the West Indian islands. Cloud-capped mountains covered from base to summit with a wealth of tropical vegetation, valleys densely cultivated with cacao, sugar-cane and fruit trees, surf-bound coasts fringed with graceful coco-nut palm trees, coral strands, whose brilliant whiteness are in pleasing contrast to the indigo blue seas of these low latitudes, form pictures of surprising charm. It would be difficult to say which is the most beautiful island. Many would award the palm to Jamaica, whose superb Blue Mountains do not belie their name when seen from afar through a framework of palm trees, and whose Bog Walk, the gorge of the Rio Cobre, enjoys an almost world-wide reputation. Others would give it to Trinidad, whose capital on the shores of the Gulf of Paria is approached through wonderful gateways of sentinel islands—the famous Bocas del Dragone, the Dragons' Mouths, through which the caravels of Columbus sailed after the great discoverer paid his first visit to the island.

Of the smaller islands, Dominica is perhaps the most beautiful, boasting, as it does, many picturesque waterfalls, while the grandeur of its mountains is unsurpassed in the West Indies. Grenada, St. Lucia, and St. Vincent are scarcely less attractive, the first-named island having its romantic Grand Étang, the 'great pond' in the mountains which fills the crater of a long extinct volcano. St. Lucia, too, has rare scenic charm, the most noteworthy view which it affords being that of Castries Harbour and the serrated coast-line from the historic Morne Fortuné over which Edward Duke of Kent, great-grandfather of King George V, hoisted the English colours on April 4, 1794. In the same island are the Pitons, strange sugar-loaf mountains which rise from the sea on the leeward coast. In St. Vincent, the mysterious Soufrière Mountain, a volcano which has a dreadful association with Mont Pelée in Martinique—they simultaneously burst into violent eruption in May 1902—forms a prominent feature of the scenery.

Population: aborigines. When Columbus discovered the West Indian Islands, he found them inhabited by two distinct races of Indians, the Arawaks and the Caribs. The former, a timid and peaceful people, occupied the larger islands, known after-

PLATE XXV. THE FIRST BOCA, TRINIDAD

(Phot. Permanent Exhibition Committee of Trinidad and Tobago, per West India Committee)

PLATE XXVI. TOBAGO: SEA-BEACH AND COCO-NUT-PALMS

(Phot. Permanent Exhibition Committee of Trinidad and Tobago, per West India Committee) wards of the Greater Antilles, while the Caribs, a warlike and truculent race, were confined to the smaller islands. The Arawaks, who were forced by the Spaniards to work in the mines of Hispaniola, were soon exterminated; but the Caribs were not so easily stamped out, and until the end of the eighteenth century they proved a constant source of trouble, and for years an obstacle to colonization. It was, indeed, not until 1796 that they were finally suppressed. In that year Sir Ralph Abercromby defeated them and their French Republican allies in St. Vincent, and the government caused the majority of the survivors to be deported to the island of Ruatan off Honduras.

The Arawak and Carib Indians still exist as distinct races in British Guiana; but in the islands a few representatives of the Carib race only remain. They have their home in St. Vincent and Dominica, where they form a peaceful and law-abiding portion of the communities, eking out an existence by fishing, raising ground provisions, and making baskets. In British Guiana, on the other hand, they maintain their warlike proclivities, though these are only now directed against neighbouring tribes.

Slaves.

When the colonization of the West Indies began in earnest, the necessity of finding labour for the plantations had to be faced, and the Spaniards eventually solved it by adopting the plan of the Portuguese and introducing slaves from Africa, an example which was soon followed by settlers of other nationalities. Sir John Hawkins began trading for slaves in 1562, and Sir Francis Drake followed in 1568. At the end of the sixteenth century the Dutch took up the trade, and in 1662 and 1672 English 'African Companies' were formed to introduce slaves, and proved a source of great wealth. In 1688 the African trade was thrown open to all British subjects, and by the end of the seventeenth century 25,000 negroes were being imported annually by British ships into the islands. The English secured the 'Assiento', or contract to supply Spanish America with slaves, in 1713, subject to the payment of a quarter of the profits to the King of

Spain; but the monopoly did not pay, and the failure of the English Company to meet a claim of £68,000 led to war in 1713, and though the agreement was renewed by the Treaty of Aix-la-Chapelle in 1748, it was annulled in 1750.

Meanwhile, favoured with an abundant supply of cheap labour, the West Indies became exceedingly prosperous and the wealth of the proprietors immense. But towards the end of the eighteenth century a cloud appeared in the horizon. The agitation for the abolition of the slave-trade commenced in 1776, and, as the outcome of a vigorous campaign conducted by Wilberforce, Clarkson, and others, the traffic in human beings was suppressed by Act of Parliament in 1807. The vigorous and long-drawn-out agitation for the abolition of slavery itself followed, and in spite of the protests of all concerned in the great sugar industry, the Abolitionists had their way, and, by the famous Act of 1833, slavery too was abolished. By the provisions of this enactment, all slaves were to become free on August 1, 1834, but were to be apprenticed to their former owners until 1838, or, in the case of agricultural labourers, until 1840, while £16,640,000 were voted as compensation to slave-owners in the West Indies. Antigua and Bermuda dispensed with the apprenticeship system altogether, and in no instance was it continued after 1838.

Labour problem: coolies.

With the abolition of slavery the labour question became acute. The erstwhile slaves, glorying in their newly-won freedom, showed a total disinclination to work, and a serious crisis resulted. Efforts were made to fill the deficiency with free labourers from Madeira, St. Helena, Rio, and Sierra Leone, but the supplies from those places proved quite inadequate. Then in 1838 a small, but very successful, experiment was made with the introduction of East Indians, and in 1845 the introduction of coolies from Calcutta, under a system of indenture, was begun. With the exception of the years 1849 and 1850, it has continued ever since, under the control of the Indian and Imperial Governments. British Guiana, Trinidad, and Jamaica now receive East Indian immigrants annually, and in the two first-named colonies

East Indians form a large proportion of the population, while they are also found in St. Lucia and other islands which once received Indian immigrants.

Chinese were also imported into British Guiana between 1853 and 1867, and a number of them found their way to the islands, where they now form peaceful and law-abiding citizens.

White population and other immigrants.

Mention having been made of the aborigines, of the negroes, and of the East Indian and Chinese immigrants, it remains to refer to the white population, which in the West Indies is, unfortunately, steadily dwindling. The white population was established in a variety of ways. First, there were the original white settlers, then in the days of slavery each slave-owner was compelled to employ a certain number of white servants, to serve in the local militias; later on Oliver Cromwell sent out many Irish prisoners, notably to Nevis and Montserrat, while Barbados received a large influx of Royalists at the time of the Commonwealth. Many English gentlemen, Royalist officers and divines, were sent out to the West Indies to be sold as slaves, and it is recorded that a number changed hands at a cost of 1,500 lb. of sugar per man.

The original type of negro in the West Indies has been greatly modified by admixture with the various white races, and at the present time all grades of colour are to be met with in the islands, the individual characteristics of the several white races being blended with those of the negro and producing different types according to the parentage, Spanish, French, or English. Thus, in Trinidad a strong Spanish element exists in the coloured classes, while in Dominica and St. Lucia, as might be expected from the earlier history of those islands, the Gallic character is very noticeable. In Trinidad, in addition to the Spanish families descended from the original Spanish settlers, there are many representatives of old French Royalist families, which migrated there from Guadeloupe and Martinique at the time of the French Revolution. In the small islands of Montserrat and Nevis the Irish element is strongly represented, for the reasons above stated. Jamaica stands, however, in a somewhat different category. Captured from the Spanish in 1655 by Cromwell's troops, which had been sent against Hispaniola, many soldiers of the invading army were persuaded to settle there. Later on a Portuguese element was introduced, and at the present time few traces remain of the original Spanish settlers.

Perhaps the most striking indication of the source of the original colonization of the islands is seen in the architecture of the older buildings. Thus, in Trinidad the Spanish type predominates, in Dominica and St. Lucia the French, while the fine old mansions which are still to be found in Barbados are strongly reminiscent of the mother country.

Chinese are met with to some extent in Trinidad, and occasionally in the islands. It is probable that they result from the Chinese imported at one time into British Guiana, or perhaps they may have drifted down from Cuba, where Chinese immigration in large numbers was at one time practised.

Portuguese are to be found in most of the islands, as a result of the immigration carried on at one time from Madeira, and of the trade relations which have existed for many years between the West Indies, notably Barbados, and the Brazils.

Effects of local conditions on immigrants.

The West Indies afford interesting opportunities for observing the effect of local conditions upon non-indigenous races. The wide variation of climate, the conditions of the northern islands, which are far more suited to white population than those of the southern while that of Barbados is more suggestive of temperate latitudes, has had the effect of producing a more stubborn strain in some islands than in others.

It is not possible to say that the long effect of the tropics on the descendants of white families originally coming from the east has been prejudicial. Where the original stock has been pure, where there has been no intermarrying with brown types, and where favourable conditions of life have been preserved, it may be stated that there has been no decadence. There is evidence of this in the representatives of families which have been resident in the tropics for many generations. When depreciation *is* seen, it has arisen from too much intermarrying, a position of affairs unavoidable when a white population is small and communication with the outer world scanty. It has been stated, as regards agriculture, that white labour in the field is impossible. There is no reason to think that with the proper material, maintaining a life suitable to the conditions, white labour in this respect would not be a success. But at the present time it may be said that field labour is entirely in the hands of the coloured races. Where the stock has remained pure, where there has been no admixture with white blood, the negro races have retained their physique. As regards the East Indian immigrants, there is not the slightest doubt that the change of residence and general conditions has produced a vast improvement in them mentally and physically. There is no comparison to be made between the coolie as he arrives and as he is after a few years' residence. The self-reliant, hardy peasant proprietor would not be recognized as the cringing, low individual of the early days of indenture.

Census.

The census taken in 1911 showed the population of the various West Indian islands, British Guiana, and British Honduras, to be as follows :

	1911.	*Per Square Mil*
Bahamas	54,944	12·7
Barbados	171,982	1036·0
Jamaica	831,383	197·6
Turks and Caicos Islands	5,615	33·8
Trinidad and Tobago	333,552	179·2
Grenada	66,750	501·9
St. Lucia	48,637	208·7
St. Vincent	41,877	299·1
Antigua	32,265	189·8
Virgin Islands	5,557	95·8
St. Kitts	26,283	404·4
Nevis	12,945	258·9
Anguilla	4,075	116·4
Montserrat and Redonda	12,316	379·0
Dominica	33,863	111·0
British Guiana	296,041	3·3
British Honduras	40,458	4·7

Education. In the old days of slavery, education was practically non-existent in the British West Indies. It was not considered desirable in those unenlightened times for the slaves to be taught to read or write, and even the upper classes had few opportunities of educating their children locally. Those who could afford to do so consequently sent their sons and daughters to Europe, where, however, the standard of education at that period was far from high.

The long-drawn-out agitation for the abolition of slavery in the British West Indies brought about a change. Private benevolence had already endowed Codrington College in Barbados, and the sporadic efforts of a few individuals were now supplemented by missionary enterprise on the part of various religious bodies in the mother country which led to the formation of schools here and there.

In bringing about the emancipation of the inhabitants of the West Indies from total ignorance, an important part was played by the Mico Charity, the history of which is interesting. In 1666 Lady Mico, the widow of Sir Samuel Mico of the Mercers Company, died, and in her will bequeathed £1,000 for the redemption of Christians made prisoner by Moorish pirates. Freehold premises in London were purchased, and, as shortly afterwards Algerian piracy was suppressed, the funds accumulated until, in 1830, they amounted to £120,000. Sir Thomas Fowell Buxton then suggested that the interest might be applied to the Christian instruction of children in the West Indies, and a charter was obtained, the home government contributing £17,000 per annum, which was continued until 1841. Training institutions were established in Jamaica and Antigua, and schools in Trinidad, the Bahamas, and St. Lucia, together with Mauritius and the Seychelles. In 1841 the government grant ceased, and with the exception of the Mico Institute in Jamaica, which still flourishes, these educational establishments were gradually closed.

Before passing to a question of state-aided education,

PLATE XXVII. ST. GEORGE'S, GRENADA

(Phot. Government of Grenada, per West India Committee)

PLATE XXVIII (*a*). CODRINGTON COLLEGE, BARBADOS
(Phot. A. E. Aspinall, West India Committee)

PLATE XXVIII (*b*). PORT ANTONIO, JAMAICA
(Phot. West India Committee)

Codrington College, Barbados.

mention must be made of Codrington College in Barbados, which is the only institution in the West Indies where an English university degree can be obtained. This unique institution was founded by Christopher Codrington, governor-general of the Leeward Islands, who died in 1710 and bequeathed his two sugar estates, 'Consett's' and 'Codrington's' (now 'College' and 'Society'), which consisted of 763 acres, three windmills and a sugar factory, 315 negroes and 100 head of cattle, to the Society for the Propagation of the Gospel, in trust, for the maintenance of a convenient number of professors and scholars, 'all of them to be under the vows of poverty, chastity, and obedience; who shall be obliged to study and practise Physic and Chirurgery, as well as Divinity; that by the apparent usefulness of the former to all mankind, they may both endear themselves to the people and have the better opportunities of doing good to men's souls, whilst they are taking care of their bodies.' The college was opened as a grammar school in 1745, but was not based on a proper academic footing until 1834, when Bishop Coleridge interested himself in the foundation. Until 1875 the college conferred its own testamurs; but in that year, through the exertions of Bishop Mitchinson, then Bishop of Barbados, and the visitor of the college, it was affiliated to Durham University.

Primary education.

It was not until the latter part of last century, when the islands may be said to have recovered to a great extent from the effects of the abolition of slavery, that the question of primary education was taken up by the several governments, and that departments of education were formed. The policy generally followed was to give grants where denominational schools already existed and to establish additional undenominational schools where necessary under direct government supervision.

Barbados.

In Barbados the primary schools are all denominational, the bulk of them being under the control of the Church of England. As regards the higher grade schools, Harrison College, the Lodge, and the Combermere are the principal boys' schools receiving government aid, while

Queen's College and the Alexandra School for Girls fall under the same category.

Jamaica. In Jamaica the 700 or more primary schools are entirely official; government scholarships to the extent of £600 are given, while the island has the advantage of having been selected by the trustees under the will of Cecil Rhodes to participate in the munificent scholarship scheme instituted by that statesman. Every year a Rhodes Scholar is selected by a committee consisting of the governor, the chief justice, the inspector of schools, the chairman of the Schools Commission, and a fifth member elected by co-optation. In two years out of three the competition is open to Jamaica boys whether educated in the island or abroad; but in the third year it is confined to boys educated in the island.

Trinidad. Of the Trinidad primary schools, four-fifths are denominational and receive grants, the remaining fifth being under government control. In addition there are special training schools for teachers. Representing the higher education, there are the Queen's Royal College and the Roman Catholic St. Mary's College in Port of Spain, while the Presbyterians are represented by the Naparima College affiliated to the first-named institution. A sum of £650 a year is granted by the government in scholarships, while there are several convent schools, together with a high school for girls.

Other islands. Of the 46 primary schools in Grenada, 9 are provided by the government. At the suppression of the Mico Trust superintendence of schools in St. Lucia, in 1891, three of them were taken over by the government and the others handed over to the Roman Catholic body. In St. Vincent the primary schools are under the entire control of the government, by which a high school for girls is also supported.

With the exception of Dominica, the primary schools in the Leeward Islands are entirely controlled by the religious bodies, with the assistance of grants from the government. Various secondary schools receive grants, and in Antigua there is a primary school at St. John's.

In Dominica a special agricultural state-aided school exists.

In the Bahamas there is a government system of elementary education which was established in 1847. There are now 48 unsectarian government schools, 19 aided schools, and 37 denominational schools. Higher education is provided for by the Nassau Grammar School, Queen's College, and St. Hilda's School.

In recent years, since the establishment of the Imperial Department of Agriculture through the foresight of Mr. Chamberlain in 1898, much has been done in the direction of agricultural training in the primary schools, practical illustrations with the aid of school gardens being carried out when practicable.

Religion.

Every well-known religion of the world is represented in the British West Indies, a circumstance which is due to the cosmopolitan character of the population of the islands as a whole.

In many parts, notably in Jamaica, the Jewish religion is strongly represented. In the islands which came to us from the French most of the inhabitants are Roman Catholics, while in Barbados and the islands settled by the English the principal religion is that of the Church of England. The Wesleyan and Moravian Churches have also large followings, and so, too, has the Baptist Church. The introduction of East Indians has brought in its train Muhammadanism and Buddhism.

The early settlers from the mother country were accompanied by their own chaplains and divines. In 1630 a Church of England divine was a member of the governor's council in St. Kitts, and as early as 1629 Barbados was divided into six parishes; six churches, besides chapels, being built shortly afterwards in the island. Colonists at that time were obliged to conform to the charge and rules of the Church of England, and the practice of the church as regards maintenance of the Sabbath, family prayers, and general conduct was strictly enforced. It is recorded, however, that even at that period Anabaptists, Jews, and Quakers existed in the island. At the present time the Church of England is the official church of Barbados, its clergy being on the civil list of the island.

In Jamaica some of the chaplains of our troops which took possession of the island in 1655 remained with the garrison and settled there, forming the nucleus of the local church. In 1662 the Church of England was duly established in the island, and remained so until 1870, when gradually disendowment was set in motion. The Church of England is now no longer established in Jamaica, but is self-supporting.

Anglican bishoprics.

At the present moment the Church of England in the West Indies is divided into four bishoprics, those of Jamaica, Barbados, Trinidad, and Antigua (the Leeward Islands). The see of Barbados includes the Windward Islands (Grenada, St. Vincent, and St. Lucia), while Turks and Caicos Islands and the Grand Caymans are included in the diocese of Jamaica. The Bishop of Jamaica is also Primate of the West Indies. The Church of England was disendowed in St. Vincent and Grenada in 1889.

Roman Catholics.

The Roman Catholic religion is strongly represented in the West Indies. In fact, in Dominica, Grenada, St. Lucia, and Trinidad the bulk of the Christian population belong to this faith. A Roman Catholic bishop resides in Dominica and an archbishop resides in Trinidad. The religious order to which the West Indian islands is assigned is that of the Dominicans.

Nonconformists.

Of the Nonconformists, the Moravians were the first in the West Indies, their missionaries arriving in the middle of the eighteenth century. The Wesleyans commenced their propaganda in Antigua in 1789, as the outcome of Mr. Gilbert, the Speaker of the Assembly, meeting John Wesley himself, while the Baptists owe their position to American emigration at the time of the American Revolution.

As already mentioned, East Indian immigration brought in its wake Buddhism and Muhammadanism, which are especially apparent in Trinidad, and priests of those persuasions have been among the immigrants.

Speaking of the West Indies as a whole, there may be said to be a strong religious feeling throughout, whatever the sect to which the people belong. This state of affairs is deservedly encouraged by the various governments, who recognize the great value of the practice of religion as a means to the preservation of order.

Constitutions.

It is a common error to classify the British West Indies as Crown colonies. It is true that the majority of them do fall under that category, but Barbados and the Bahamas possess representative institutions, while in British Guiana the constitution of the legislative council does not provide for an official majority. None of the colonies, however, possesses responsible government, and in all the administration is carried on by public officers under the control of the Secretary of State for the Colonies. Officially the islands are classified as follows:

1. Colonies possessing an elected house of assembly and a nominated legislative council:—the Bahamas and Barbados.
2. Colony possessing a partly elected legislative council the constitution of which does not provide for an official majority:—British Guiana.
3. Colonies possessing a partly elected legislative council the constitution of which provides for an official major.ty: —Jamaica and Leeward Islands.
4. Colonies possessing a legislative council nominated by the Crown:—British Honduras, Grenada, St. Lucia, St. Vincent, and Trinidad and Tobago.

The question of federation.

It is this remarkable lack of uniformity in the constitutions of the several West Indian colonies which proves one of the most serious obstacles in the way of the federation of the islands. The inhabitants in the Bahamas and Barbados are justly proud of the representative institutions which, in the island last named, the people have enjoyed for over two centuries and a half, and they would be most unwilling to surrender their constitution. To have any real voice in the councils of the Empire the Federated West Indies would have to be given self-government, and there are few who would venture to say that the present political state of the islands would justify the grant to the West Indies, as a whole, of representative institutions.

Constitution of Barbados.

The constitution of Barbados was first granted by King Charles I, in 1627, and confirmed by the Commonwealth in the Articles of Agreement for the surrender of the island which have been called the Charter of Barbados. The government consists of a nominated legislative council of nine members, and a house of assembly consisting of twenty-four members elected annually by the people on the basis of a moderate franchise. At general elections to the latter body there is frequently no contest, a fact which speaks volumes for the contented state of the inhabitants, who prefer to devote their time to the development of the island rather than to political strife, an example which might with advantage be followed elsewhere. Next to the house of commons and the house of assembly in Bermuda, the Barbados house of assembly is the most ancient legislative body in British oversea dominions. The executive functions of the government are performed by an executive council which consists of the governor, the colonial secretary, and the attorney general *ex officio*, and such other persons as may be nominated by the King, and of an executive committee which consists of the members of the executive council, one member of the legislative council, and four members of the house of assembly nominated by the governor. This executive committee introduces all money votes and government measures and prepares the estimates.

Constitution of the Bahamas.

The constitution of the Bahamas is very similar to that of Barbados. By an Order in Council dated July 25, 1728, a general assembly with legislative powers was constituted. This assembly met for the first time on September 29, 1729. There is now an executive council consisting of the governor, the colonial secretary, the attorney-general and receiver-general as *ex officio* members and five official or unofficial members. Every member, other than an *ex officio* member, must vacate his seat after five years, but may be reappointed. The legislative council consists generally of nine members, nominated by the governor and confirmed by the Crown. The house of assembly consists of 29 members elected for seven years on a most liberal franchise which amounts practically to manhood suffrage, there being in 1911 no fewer than 13,768 voters on the electoral roll.

Constitution of Trinidad.

Trinidad, which was acquired by conquest in 1797 from Spain, is an example of a pure Crown colony. The government is administered by a governor assisted by an executive council of five members. The legislative body is the legislative council of Trinidad and Tobago, which was re-constituted in 1898, and now comprises the governor, colonial secretary, attorney-general, solicitor-general, auditor-general, inspector-general of constabulary, director of public works, surgeon-general, protector of immigrants, receiver-general, collector of customs, and of such unofficial members as the government may appoint. These unofficial members hold their seats for five years and are eleven in number.

Tobago, which, like all the other West Indian colonies with the exception of Trinidad, used to have representative institutions, has since 1899 been administered as a ward of Trinidad.

The Windward Islands.

Grenada, St. Vincent, and St. Lucia are united in one government for certain purposes under the title of the Windward Islands. As early as 1764 there was one governor for the Southern Caribbee Islands of Grenada, Dominica, St. Vincent, and Tobago. In 1833 St. Vincent was brought with Barbados, Grenada, and Tobago under one government with head-quarters at Barbados, and in 1838 St. Lucia was included. Then in 1885 letters-patent were passed constituting the government of the Windward Islands, omitting Barbados, while Tobago was subsequently united with Trinidad. Grenada and St. Vincent both had at one time their elected houses of assembly, but they passed resolutions abdicating themselves and leaving the remodelling of the constitution in the hands of the Crown, which adopted the Crown colony system. St. Lucia, originally governed by French laws and systems, is now also a Crown colony.

Each island of the Windward Islands colony still retains its own institutions and there are no common legislature, common laws, revenue, or tariff, and the few institutions which the islands have in common are a court of appeal and a common audit system.

The Leeward Islands.

The Leeward Islands form a far closer federation. This colony came into being by virtue of the Leeward Islands Act, in 1871, and the federal council as reconstituted in 1899 consists of eight official and eight elective members. Three elective members are chosen by the unofficial members of the legislative council of Antigua, two by those of the legislative council of Dominica, and three by those of the legislative council of St. Kitts and Nevis. They must be and continue members of their respective island councils. The official members are the governor, the colonial secretary, the attorney-general, the auditor-general, the administrators of St. Kitts-Nevis, and Dominica, and the commissioners of Montserrat and the Virgin Islands.

The legislative council has concurrent legislative powers with the local legislatures on certain subjects specified in the Act, such as matters of property, mercantile and criminal law, the law relating to status, the maintenance of a general police force and a common convict establishment, quarantine, postal and telegraph affairs, currency, audit, weights and measures, education and the care of lunatics, all matters relating to immigration, copyright and patents, and its own constitution and procedure. Any island legislature is competent, in addition, to declare other matters to be within the competency of the general legislature. Any island enactment on such subjects is void if repugnant to an enactment of the general legislature, or may at any time be repealed or altered by one.

Jamaica.

The constitution of Jamaica may be described as a modified Crown colony system, the people enjoying to some extent direct representation. The original constitution granted by Charles II in 1662 was a representative one consisting of a governor, a privy council and legislative council, and an assembly of forty-seven members; but the depression caused by the abolition of slavery led to a series of grave constitutional crises, the assembly refusing time after time to vote supplies. In 1839 Lord Melbourne's government introduced a Bill into Parliament for a suspension of the constitution, but it was defeated, and it was not until 1854 that harmony was temporarily restored by certain changes which were made after the Morant Bay rebellion in 1865. Governor Eyre urged a change in the constitution and the legislature willingly responded, and in 1866 surrendered the constitution which the island had enjoyed for over two hundred years. A legislative council was then formed by an Order in Council of 1866 and 1869 consisting of such official and unofficial members as Her Majesty might think fit, the numbers of which were six until 1878, when they were enlarged to eight, a ninth being added in 1881.

By an Order in Council dated May 19, 1884, and amended in October 1895, a legislative council was constituted, consisting of the governor and five *ex officio* members, and of such other persons, not exceeding ten in number, as the Crown might from time to time appoint, or as the governor from time to time might provisionally appoint, and fourteen persons to be elected. A privy council, with the usual powers and functions of an executive council, was also provided for. The Order in Council laid it down, however, that the votes of the nominated members were not to be recorded against the unanimous votes of all the fourteen elected members on any question, unless the governor declared that, in his opinion, the decision of such question in a sense contrary to the votes of the elected members was 'of paramount importance to the public interest'.

The full number of nominated members was not at first appointed, but in 1899, consequent upon the refusal of the legislature to pass a tariff Bill, Sir Augustus Hemming, the then governor, acting on the instructions of Mr. Chamberlain, completed the full number of nominated members by the addition of four. These four members were subsequently withdrawn, but in the following year they were reappointed, and since then the official members have been in a majority, the functions of the elected members being reduced to a purely advisory basis.

§ 2. *British Honduras*

Topography.

The colony of British Honduras is situated on the mainland of Central America, on what is termed the Mosquito Coast. It lies between 18° 29′ and 15° 54′ N. lat. and 89° 15′ and 87° 50′ W. long., and is 300 miles from Jamaica. It is bounded on the north by Mexico, from which it is separated by the Hondo River, and on the west and south by Guatemala. Its area is 8,598 square miles, or only slightly less than that of the whole of the British West Indian islands put together.

The character of the country is similar to that of most of the coast lands of Central America. The front lands are low and swampy, and the country rises gradually until the high lands are reached at the back of the colony.

The soils of the colony are described as the Cohune ridge, which comprises the alluvial deposits along the river valleys, the pine ridge—long sandy tracts covered with pines, scrub, and grass and the broken ridge which is intermediate between the two. The country is thickly wooded, and produces fine timber, notably mahogany and logwood. There are several important rivers, the chief of which are the Belize River, at the mouth of which the capital is situated, the New River, the Hondo River, and the Sibun. The Belize runs from the west boundary of the colony eastward a distance of about 150 miles, and beyond 30 miles from the mouth navigation is interfered with by rapids. The Hondo and New rivers are navigable for a greater distance, craft drawing 4 feet or thereabouts being able to go up them for about 60 miles.

Population.

The original inhabitants of British Honduras were Indians who were called Mosquito Indians from the name of the coast.

In 1638 adventurers were attracted to the country by the fine timber on the banks of the Hondo and other rivers and made their quarters at St. George's Cay, where they settled with their slaves, who formed the nucleus of the present negro population. Caribs from St. Vincent were deported in 1796 to the island of Ruatan off Honduras, but no pure-blooded survivors of them remain.

The population of the colony at the present time is exceedingly sparse, being 40,458 only, or 4·7 souls to the square mile. This state of affairs is no doubt due to the fact that by the agreement made between Spain—for the territory was recognized as being Spanish—and the original settlers agriculture was prohibited for over 160 years, timber-cutting only being permitted. The population includes 400 Europeans, 200 white Americans, and 2,000 persons of European descent.

Education and religion

The schools of British Honduras, both secondary and primary, are, with few exceptions, denominational. Nearly all the primary schools are aided by the colonial government. The dominating religion in British Honduras is that of the Church of England. The colony was originally part of the see of Jamaica, but in 1883 it was formed into a separate bishopric. Other denominations include those of the Roman Catholics, the Free Church of Scotland, the Wesleyan Methodists, and the Baptists. No church in the colony is established and none receives any grants from the government.

Constitution.

When the home government first recognized the settlement of British Honduras they appointed a superintendent to manage its affairs, and it was not until 1839 that it received the assistance of an executive council. In 1853 a legislative assembly was formed, consisting of eighteen elected and three nominated members, and on May 12, 1862, the settlement was declared a colony and a lieutenant-governor was appointed subordinate to the governor of Jamaica. In 1870 the legislative assembly was abolished by local enactment and a legislative council was substituted for it, consisting of five official and not fewer than four unofficial members, with the lieutenant-governor as president. The council now consists of three official and five unofficial members. The executive council comprises the governor and six members three of whom sit *ex officio*, the other three being nominated.

§ 3. *British Guiana*

Topography.

The great colony of British Guiana, though situated on the mainland of South America, has so many interests in common with the West Indian islands, that it is generally considered an integral part of the British West Indies. It has a coast-line of about 250 miles in length on the Caribbean Sea, and is bounded by Venezuela on the east, by Surinam or Dutch Guiana on the west, and by Brazil on the south. The area of the colony is about 90,277 square miles, and extends from 9° to 1° N. lat., and from 57° to 61° W. long.; but only about 130 square miles of it are at present under cultivation. The inhabited portions of the colony consist of the alluvial flat land extending along the sea coast from mid-water mark to a distance of about 10 miles inland, and along the banks of the rivers for a considerable distance from their mouths. The chief of these rivers are the Demerara, the Essequibo (with its principal tributaries the Mazaruni, the Cuyuni, the Potaro, and the Rupununi), and the Berbice, which give their names to the three counties into which British Guiana is divided, and the Corantyne, which separates the colony from Dutch Guiana.

The 'front lands', as the alluvial flat is called, are below the level of the sea, which is kept out at high tide by an elaborate and costly system of sea defences established during Dutch occupancy.

Forest land.

Beyond the alluvial coast-lands is a great belt of 150 miles in depth, gradually rising from the low level of the coast till it culminates in an elevated and hilly land averaging from 1,500 to 2,000 feet in height, where the forest is succeeded by well-watered savannahs, or treeless plains, which extend for many miles into Brazil and Venezuela. Close to and parallel with the coast are a number of sandy reefs which are believed to have been left successively by the receding sea.

Of the above-mentioned rivers, the largest and most important is the Essequibo, which rises in the Acarai Mountains in the extreme south and flows in a northerly direction, receiving the waters of many tributaries on its way to the sea. In one of these—the Potaro—occurs the most notable of the many waterfalls in the colony, namely, the world-famous Kaieteur, or Old Man's Fall, which was first discovered by Mr. Barrington Brown, of the Geological Survey, in 1870. The Potaro here precipitates itself over a sandstone and conglomerate table-land into the deep valley below. The Kaieteur is five times as high as Niagara, and it is claimed that it represents a far greater horse-power than that of the North American fall. Rivers.

Although it is 620 miles long, the Essequibo River is only navigable by vessels of any size for a distance of 50 miles from its mouth, owing to rapids and cataracts along its course. The Demerara River, on the other hand, which has a length of 200 miles, offers a safe passage for ships for a distance of nearly 70 miles. The Corantyne, which is 600 miles long, is also much broken by cataracts, but the Berbice is accessible for a distance of 175 miles or more from the sea. About 100 miles from the mouth of this river was situated the old Dutch capital of Berbice, Fort Nassau.

British Guiana has several mountain ranges, of which the Pakaraima, in the west of the colony, is the most important. It is in this range that the highest mountain, Mount Roraima, which rises to a height of 8,740 feet, is situated. Roraima is remarkable for its conformation, having extremely precipitous sides and a flat water-worn summit of upwards of 15 square miles in extent, in which the boundaries of Guiana, Venezuela, and Brazil meet. It was first ascended by Sir Everard im Thurn in 1889, but has rarely been visited since. Mountains.

The scenery of the front lands of British Guiana, which are below the level of the sea, is not without charm. Georgetown, the capital, is a scrupulously clean city laid out on a rectangular plan, and boasts many Scenery.

noble examples of colonial architecture. The buildings, both private and public, are constructed of wood, and it is surprising how picturesque many of them are with their gay gardens and handsome trees. Many of the streets have drainage trenches and canals on which the superb Victoria Regia lily flourishes; but the tendency has been to fill in the canals in recent years. New Amsterdam, at the mouth of the Berbice River, is also a pleasing town in this tropical Holland.

In the interior of the colony, the scenery is particularly grand. Rapids, cataracts, and water-falls, mountains romantic in outline and formation, dense forests, gorgeous tropical vegetation, and rolling grassy plains are its chief characteristics.

Population: aborigines.

The aborigines of British Guiana are Indians, of whom there were many varieties. They, however, belonged to four distinct tribes, each speaking an entirely different language, namely: (1) the Warraus, (2) the Arawaks, (3) the Caribs, and (4) the Wapisianas. The first named are now called the Swamp Indians, living as they do in the low-lying coast-lands of the north-west of the colony. The Arawaks live in the higher lands and are more civilized than any of the other tribes. The Caribs may be subdivided into the true Caribs, the Arecunas, the Akawois, and the Macusis, and of these the true Caribs still maintain their traditional fighting instinct. The Wapisianas are mostly traders in the southernmost parts of the hinterland.

Immigrant population.

The European population of the colony comprises colonists from the mother country and their descendants, and families of Dutch descent. Immigration from Madeira soon after the abolition of slavery is responsible for the large number of Portuguese in the colony. As elsewhere in the West Indies, the abolition of slavery had a disastrous effect on the labour supply. The freed negroes declined to work, and formed themselves into village communities. To supply the labour market immigrants were introduced from Madeira, Malta, Germany, and the United States, and in 1853, 647 Chinese were introduced, to be followed by some 12,000 more between 1859 and 1867. But European immigration proved a failure, and Chinese immigration was discontinued in 1867, owing to the attitude adopted by the Chinese government with regard to returning immigrants.

Meanwhile an experiment had been successfully made in 1838 in the direction of immigration from India. At first some trouble arose through the uncertainty of the East Indians finding work on their arrival, and many wandered about the colony and died. The immigration system lacked organization at the outset, but all difficulties were eventually overcome by the establishment of the principle of indenture, and in 1845 the introduction of labourers from the East Indies to British Guiana under indenture and subject to the control of the Home and Indian governments was started. With the exception of the years 1849–51, it has continued ever since.

The main features of the system are that the East Indians are recruited by emigration agencies at Calcutta and are conveyed in steamers to British Guiana, where they serve their employers for five years at a wage of 1*s.* 1½*d.* per day for able-bodied adults, and 8*d.* per day for those who do not fall under this category. All who arrived in the colony before August 5, 1898, are entitled to a return passage to India on payment of a quarter of the passage-money in the case of males, and one-sixth in the case of females. With regard to the others, the immigrants, after ten years' residence in the colony, are entitled to their return passage to India on payment of half the fare in the case of males and one-third in that of females, the balance being paid by the planter. But most of the Indians are so well-to-do in British Guiana that a comparatively small proportion avail themselves of the return passage, the majority remaining in the colony, where they form most valuable members of the community.

The system of immigration has been the subject of many official inquiries, from every one of which it has emerged triumphant. Surgeon-Major D. W. D. Comins, who was sent by the Indian government to the West Indies to report on the system, declared in 1893 that 'as regards the general arrangements made for Indian immigrants, I have nothing but admiration to express. The system has passed through successive stages of improvement, until it now stands a pattern to all the world of successful and liberal management.' Again, the committee which sat as recently as 1910 under the chairmanship of Lord Sanderson showed that Indian immigration was not only of the greatest assistance in developing the resources of some of our tropical colonies and increasing their prosperity, but that in the present condition of India, indentured emigration was the only practical form of emigration to distant colonies on any considerable scale. They also showed that Indian emigration was of benefit to the East Indians themselves.

The census of the colony taken in 1911 showed the population to be 296,041, of which no fewer than 126,166 were East Indians, while 114,718 were blacks. Portuguese number 10,044, Chinese 2,619, and Europeans other than Portuguese 3,933. The great need of British Guiana is population. It is deplorable that it should only stand at 3·3 souls per square mile; and those who have the welfare of the colony at heart or who have studied the question are convinced that the system of East Indian immigration, which has proved of such immense advantage not only to the colony but also to the immigrants themselves, should be encouraged in every possible manner.

Education.

Primary education in British Guiana is denominational, but the schools are state-aided to a very considerable extent. Education is made compulsory for all children up to the age of 12, or for those who have not passed the prescribed fourth standard. The primary education code is based on the system of grants-in-aid for each child who passes in writing, arithmetic, and sewing. In all other subjects such as geography, garden work, elementary hygiene, natural knowledge, singing, and drilling, the school is examined once a year by the inspector and classified according to results. The grants vary between

1*s*. 0½*d*. and 4*s*. 4½*d*., and there is also an attendance grant of 12*s*. 6*d*. for every 30 children presented for examination. The expenditure on grants-of-aid during the year is about £30,000, which is distributed among 221 schools with an average attendance of over 20,000. British Guiana being essentially an agricultural country, agricultural education is not overlooked. There is a system of model gardens in various districts under the direction and control of the director of science and agriculture, and a number of primary schools have gardens attached to them.

Secondary education is provided for in the case of girls mainly by private enterprise, and in that of boys by Queen's College, which is maintained by the government, and by two or three private schools. A Guiana scholarship, of the value of £200 and extending over 3, 4, or 5 years, is awarded every year on the result of an examination by the Cambridge local authorities.

Religion. Until 1879 both the Scottish and English churches were officially recognized, the clergy ranking as government officials, while grants were also made to the Roman Catholic and Nonconformist bodies. The rectories and parsonages of the Scottish and English churches were also maintained by the government. This curious double establishment was due to the fact that in some districts the Scottish predominated and in others the English, the various parishes being thus attended to by the Scottish or English church according to the tenets of the respective inhabitants.

In 1899, however, it was decided to disestablish the church, and to put the Scottish and the English churches on the same footing as the other denominations. To this end, whenever a vacancy occurs among the clergy on the Civil List, a sum equivalent to 75 per cent. of the salary attached to the post is paid to the respective governing bodies, who themselves appoint a successor. It is expected that in 1919 disestablishment will be complete, and the Scottish and English churches be on the same footing as those of the other denominations.

Nonconformist bodies represented in the colony are the Wesleyan Methodists, the Moravians, the London Missionary Society, and the African Methodist Episcopal Church.

Constitution. The original occupants of the colony were Dutch, and the constitution as it at present stands is modelled on that which the British found in operation when they took over the colony in 1803, it being part of the terms of capitulation that the laws in force at that time should be respected. The constitution then consisted of a court of policy composed of four official and four unofficial members; the former sat *ex officio*, and the latter were nominated by a body specially constituted for the purpose and called the college of keysers, the members of which were elected by the inhabitants on a certain franchise. When the budget or any money matters were concerned, the court of policy was augmented by the financial college, consisting of six members elected directly on the same franchise as the college of keysers; the joint body thus formed was called the combined court, which at this time had no power to regulate the amount but only the nature of the taxation.

As in Jamaica, under the British rule constant disputes occurred as to the authority of the Crown. While admitting the right of veto in relation to laws, it was claimed by the colonists that the combined court had absolute power in regard to the spending of money, especially as to the Civil List, which is voted every five years. In 1891, as the result of friction with and pressure from the Crown, a change was made in the constitution. The administrative powers of the court of policy were transferred to an executive council, the college of keysers was abolished, and the unofficial members of the court of policy elected by the direct vote of the people. As the constitution now stands, therefore, it consists of the governor, the executive council, composed of certain *ex officio* and unofficial members, the latter nominated by the Crown, the court of policy, consisting of the governor, seven official and eight elected members, and the combined court, composed of the court of policy and six financial representatives directly elected. The latter body has a right, firstly, to vote the raising of money by colony taxation, and to supervise the colonial acounts; secondly, to discuss the annual estimates; and thirdly, to reduce or strike out any item in the estimates not in the Civil List.

§ 4. *Bermuda*

Topography.

The Bermudas, or Somers' Islands, consist of a group of some 300 islands situated in the Atlantic in 32° 15′ N. lat. and 64° 51′ W. long., and about 580 miles to the east of Cape Hatteras in North Carolina, the nearest point on the American continent, 730 miles from Halifax, Nova Scotia, and 677 miles from New York. In spite of the large number of islands, their total area is only about 19 square miles, or less than one-eighth of that of the county of Rutland.

The islands are all of coral formation and are consequently comparatively flat. Their scenery, however, is of great beauty, and their semi-tropical vegetation and delightful climate, which is largely influenced by the Gulf Stream, render them a favourite winter resort for residents on the neighbouring continent. It is claimed that nearly 30,000 tourists visit the islands every year.

The largest island, which is known as the Main Island, is about 14 miles in length and, on the average, a mile wide. In the centre of it is situated Hamilton which succeeded St. George at the east end of the island of the same name as capital in 1790. Hamilton stands at the head of a deep inlet enclosed by an encircling coral reef which renders it an admirably sheltered harbour for the small vessels which carry on the island trade.

St George, which owes its name to Admiral Sir George Somers who colonized the Bermudas, still enjoys a considerable amount of trade, and its harbour is much frequented as a harbour of refuge.

The other islands of importance are Ireland Island, on which the government dockyard and naval establishments are situated, Boaz and Watford Islands, Somerset, Smith's, St. David's, Cooper's, Nonsuch, Rivers, Ports and Godets, which form an almost continuous chain, connected by bridges and causeways. The islands have no rivers or streams, and as the water in the wells is brackish, the inhabitants depend entirely on the rainfall for drinking purposes.

Population.

The population of Bermuda, which numbers 18,994, is less cosmopolitan than that of the West Indian Islands.

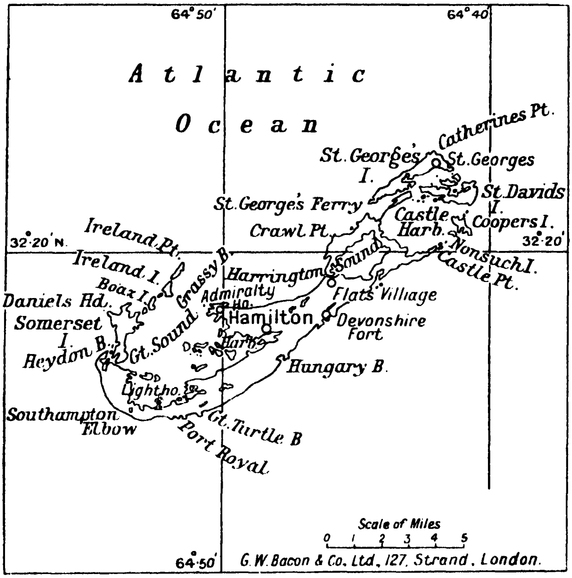

FIG. 13. Bermuda.

The blacks predominate, but there is a large pure white population in which the naval and military and official classes naturally predominate.

Education.

All the schools in Bermuda are private and charge fees for attendance, which is compulsory. The colonial legislature first granted money in aid of the elementary schools in 1839, and there are now about 27 aided schools and in addition 25 schools which are without State assistance. The central control of the aided schools is vested in a board of education, consisting of 10 members appointed by the governor under the provision of the Schools Act of 1907.

The island, like Jamaica, enjoys the advantage of nominating a Rhodes Scholar, and there is also an annual scholarship of £150 for competition among young Bermudans.

Religion.

That of the Church of England is the prevailing religion in Bermuda. The islands were at one time attached to the see of Nova Scotia, and then to that of Newfoundland, but on the formation of the synod, they were made a separate diocese in 1879. The Roman Catholic Church has also many adherents. It is attached to the see of Halifax, Nova Scotia, the archbishop of which city pays periodical visits to the islands, in addition to a Roman Catholic chaplain to the forces; and a priest is permanently stationed at Hamilton.

The Presbyterian and Wesleyan Methodist Churches also have many followers, and the Salvation Army began its work in Hamilton in 1896.

Constitution.

Bermuda enjoys representative government, which was introduced into the colony as far back at 1620, and its House of Assembly is the oldest representative body in the British Empire with the exception of the House of Commons.

Since 1684, when the charter of the Bermudan Company of London was annulled, the governors have been appointed by the Crown and the laws of the colony enacted by a legislature comprising the governor, the legislative council, and the house of assembly. The governor is assisted by an executive council, consisting at present of four official and two unofficial members. The legislative council consists of nine members, three of whom are official and six unofficial. The house of assembly consists of thirty-six members, four of whom are elected by each nine parishes.

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[See official reports of the various colonies, Jamaica *Gazette* and *Handbook*, Barbados *Official Gazette* and *Handbook*, Grenada *Handbook*, &c.; A. E. Aspinall, *The British West Indies*, London, 1912; J. H. Stark, *Guides to the West Indies*, London, 1898, &c.; H. de R. Walker, *The West Indies and the Empire*, London, 1901; and references cited in the following chapters.]

CHAPTER XIII

GEOLOGY, CLIMATE, VEGETATION, AND FAUNA

By Sir Daniel Morris

Geology

Form and grouping of the islands.

The West Indies present geological problems of great interest. Karl von Seebach and, later, Suess have devoted close attention to them. The islands as they now appear are the summits of a submerged mountain chain, forming the eastern boundary of the Caribbean Sea, and separating it from the Atlantic Ocean. The mountain system of the greater islands, such as Cuba, Jamaica, Haiti, and Puerto Rico, which forms a single chain in Puerto Rico and San Domingo, divides in Haiti, giving rise to a southern branch passing through the elongated peninsula of Jacmel to Jamaica and Honduras, and to a northern branch extending beyond Cuba towards Yucatan. A further range is that of the Sierra Maestra in southern Cuba, running through the Cayman group, the bank of Misteriosa, Viciosas, and Swan Island, to the depths of the Gulf of Mexico and reappearing inland. As originally suggested by von Buch and more fully elaborated by Suess, the West Indies may be divided into three natural groups : the first and innermost, confined to the Lesser Antilles, is wholly of volcanic origin—this group is composed of the islands of Saba, St. Eustatius, St. Christopher or St. Kitts, Nevis, Montserrat, the westerly half of Guadeloupe, Dominica, Martinique, St. Vincent, the Grenadines, and Grenada. These form a continuous arc with numerous eruptive centres, such as those now existing in Guadeloupe, Martinique, St. Lucia, and St. Vincent. The next group comprises the lofty and picturesque mountains of the Greater Antilles, with a narrow but well-defined extension in the Lesser Antilles. Suess regards these mountains as formed 'in complete accordance with the type of the coast Cordilleras of the south and of the mountain ranges of Venezuela '. They are of Lower Cretaceous age ; but highly fossiliferous limestone deposits of the Upper Cretaceous are also present, as in Trinidad and Venezuela. In Jamaica, as will be shown later, some of these deposits present close resemblances to certain beds in Europe. To this second group belong Cuba, including the Isle of Pines, Haiti, Puerto Rico, the Virgin Islands, St. Croix, Anguilla, St. Bartholomew, Antigua, the eastern half of Guadeloupe, and a part of Barbados. A southern arc runs through Jamaica. In the Lesser Antilles the girdle runs entirely outside the volcanic islands.

The third and outermost group is composed of mid-Tertiary rocks and even more recent deposits. There are practically no mountain ranges. The general surface is composed of low hills and modest elevations of an undulating character, with stretches of rough limestone, gravel, and sand. The group broadens towards the north-west and gradually narrows towards the south-west. It includes all the Bahamas islands, the banks of trifling heights towards the south-east as far as Natividad, then Anegada, Sombrero, Barbuda, and a part of Barbados. Suess suggests that the peninsula of Florida, and possibly the level parts of Yucatan, may prove to be outlying areas of this group.

Tectonic movements.

It follows from the preceding observations that the whole of the middle or principal group of the West Indian islands, from the western end of Cuba, through Jamaica, Haiti, and Puerto Rico to Barbados, is composed of the same class of rocks. Granite and gneiss-like rocks, conglomerates and schists, older eruptive rocks, serpentine, crystalline limestone and sandstones, which, as far as can be determined by organic remains, are all of Cretaceous age, and form the visible remnant of a once continuous mountain range. It is the same series of rocks as that found in Trinidad and the northern chain of Venezuela. In Miocene times there was a great depression of the whole Antillean region, when only a few peaks were visible, with free communication between the Atlantic and Pacific Oceans. On the other hand, according to Hill, the most important elevatory movement was at the close of the Pliocene period, amounting to 3,000 feet, which, he claims, gave opportunity for the migration of elephas from the continent to Guadeloupe, and for the large rodents to enter the region now constituting the island of St. Martin. This was also the period when the two Americas were connected by the West Indian bridge.

Jamaica. Through the labours of Mr. J. G. Sawkins, F.G.S., and later of Mr. R. T. Hill, the geology of Jamaica is comparatively well known. The older formations are of late Cretaceous age, when the crests of the mountains began to appear above the water, and in succeeding epochs grew more and more conspicuous. It is evident that about the same period volcanic activity was in existence in the near neighbourhood. This was followed by a considerable degradation of the volcanic heaps by erosion, as shown in the vast sediments of the upper part of the Blue Mountain series, especially in the Richmond beds.

It is probable that following this, according to Hill, there was a re-elevation of the sea-bottom and the restoration of the land area to proportions far beyond its present outline, probably connecting it with the adjacent island of Haiti in the east, and the Central American region in the south and west. These movements collectively produced great oscillations, whereby, since the close of Cretaceous times, the land and sea-bottom have moved up and down, resulting in the expansion or shrinking of the respective areas in harmony with these movements. The oldest formations which compose the higher mountains and the nucleus of the island structure consist of stratified shells and conglomerates, tuffs, débris of volcanic material, and, rarely, marine fossiliferous limestones and marls, all of which have undergone great displacements and deformation. Hill divides these deposits into, (1) an upper division (Eocene), representing the Richmond beds, and (2) a lower division (Upper Cretaceous), comprising in descending order the Minho, Ballard, Logie Green, Frankenfield, and Yallahs beds. The complex folding and consequent concealment render it impossible to determine the exact base of the series. The conglomerates apparently constitute the visible base. According to Hill, evidence of some older or lower-lying beds, plutonic, crystalline, granitic, or other, such as are reported from Cuba and Haiti, have been sought in vâin. The Cretaceous beds referred to above contain the remains of very large Radiolites and Barrettia, a remarkable genus of Rudistes, while the fauna with Acteonella and Hippurites brings them into the same horizon as the Gosau beds of southern Europe.

The limestone districts.

The second important formation is the oceanic material constituting the white and yellow limestones, which rest unconformably upon, but do not completely overlap, the oldest formation. The interpretation of these limestones has been an important problem in Jamaica geology. It is possible they represent several distinct formations and ages, but the greater portion is doubtless of Oligocene age. The white limestones cover five-eighths of the surface of the island. They form the so-called plateau region, but are much dissected and rise in Clarendon to a height of 3,000 feet. The John Crow ridge (2,100 feet) is a remnant of the old summit level. Isolated remnants of the plateau occur also in the Healthshire Hills of St. Catherine, the Braziletto Mountains, and the Portland Hills of Clarendon. The Cock-pit country extending to the north and west of the Clarendon ridge is developed in the upper part of the white limestones. The many basin-shaped depressions and canyon-like valleys, illustrating the powerful effects of solution and erosion in this formation, constitute some of the most interesting physiographical features of the island.

Igneous rocks.

Rocks of an igneous character are widely distributed. They assume the form of dykes or intrusive masses and bosses, cutting up the Cretaceous and conglomerate beds and producing important modifications of texture. For instance, shales and clays are highly indurated and baked into porcelain and jaspery rocks and sands into quartzitic beds. In St. Thomas-in-the-vale the igneous rocks are of a dioritic type, while further west great masses of porphyry are met with. The only locality in Jamaica where there is true volcanic rock *in situ* is at Black Hill, near Low Layton, midway between Buff Bay and Hope Bay. The amygdaloid basalts are exposed in a tunnel of the Jamaica railway and apparently extend to a depth of 700 feet below the summit. They form a volcanic neck rather than a superficial lava flow. The characteristic fossils indicate that the Montpelier limestones of the oceanic series were deposited contemporaneously or soon after this tertiary eruption.

Recent formations.

The more recent Jamaican formations consist of deposits of alluvium, oceanic marls, and coral-reef rock. These lie adjacent to the present coast, and represent fringing reefs and other accretions around the island border after it had attained its present area and outline. A narrow strip of low land extends almost uninterruptedly around the island between the sea and the lower coast hills. This is composed of elevated coral reef, marginal sea débris, and land alluvium. The Liguanea plain on which Kingston stands, and extending westward for twenty-five miles, is the largest of the coast plains. In economic geology and the occurrence of minerals and metallic ores, Jamaica is not remarkably rich. Copper is said to be widely diffused, both as a carbonate and in veins ; gold, lead, manganese have also been met with in small quantity. Two thermal mineral springs, one at Bath in St. Thomas-in-the-east, and the other at Milk River in Clarendon, are noted for their medicinal properties.

Earthquakes.

In historic times Jamaica has suffered from two severe earthquakes. The first, in 1692, overthrew a large portion of Port Royal, when 2,800 houses were destroyed. This led to the settlement of Kingston. The second severe earthquake took place in January 1907, when 800 lives were lost and property destroyed to the value of about two million sterling.

British Honduras.

The northern half of the Colony of British Honduras forms a vast plain of about 1,000 square miles, sloping gently towards the coast. In the southern half there are several ranges of hills, culminating in the Cockscomb Mountains with Victoria Peak reaching a height of 3,700 feet. The prevailing type of formation is Tertiary, with underlying strata composed of granite, quartzite, and carbonaceous shales, sandstones, and limestones, cropping up in the low detached ranges intersecting the country to the west and south of Belize. The rivers flowing north-east and south-west from the interior mountains, or near the frontier of Guatemala, traverse valleys containing the rich alluvial soils known as Cohune ridges. Between these valleys are large stretches of country covered with dry gravelly or sandy soil supporting scattered patches of pine-trees and low palms. Further inland are elevated savannas and open grassy country with oak-trees. The river valleys or Cohune ridges yield fine mahogany, cedar, and logwood trees, and they constitute the chief agriculture areas of the colony.

British Guiana.

As may be assumed from the continental conditions existing in British Guiana, the geology differs markedly from that of the West Indian Islands. The coast lands, of varying width, form a plain of marine alluvium. The plain is broken here and there as in the north-west by low hills and traversed by lines of sand dunes of wind-blown origin. The sands and clays of the alluvial areas have been deposited in comparatively recent geological periods by the rivers from the high lands of the interior. Extensive beds of peat known as ‘ pegass ’ occur in some localities. They vary in depth from 2 to 4 feet, but occasionally they develop a depth of 11 or 12 feet. What Professor Harrison describes as ‘ residuary deposits ’ composed of sands and clays are found in the lowlands along the courses of the great rivers and the adjoining valleys ; also on the lower parts of many of the hills and mountains. The heavy tropical rains have carved out these deposits and the gravel, sands, and silts derived from the eroded material have been laid down in the wider valleys as fluviatile loams, gravels, and sands. It is in these deposits that ‘ the readily available mineral wealth of the colony is found ’.

Turning to the sandstone and conglomerate series we find these occupy large areas of the colony. The name Kaieteurian has been suggested for this important group. It constitutes the greater portion of the Pakaraima Mountains and it spreads westward into Venezuela. The rocks appear to be unfossiliferous. Hence there is no evidence of their geological age. They lie invariably on the presumably Archaean rocks. According to Anderson, the Pakaraima Mountains may be regarded as the most extensive sandstone formation in the world. Brown and Sawkins estimate the total thickness of the sandstone formation at about 3,000 feet. More recent investigation has shown that probably it does not exceed that shown at Roraima, namely, about 2,000 feet. As a rule the sandstone lies nearly horizontally. Many of the beds of fine texture show well-marked current bedding. The general geological structure of the colony in the district not covered by the sandstone formation may be said to resemble closely that of the north-eastern sea-board of North America and of the Brazilian sea-board of South America north of Rio Janeiro. True granite is said to be not very abundant in British Guiana. The largest development is the great mass extending from Makauria Point on the Essequibo River to the south end of Karia Island on the Mazaruni River. Similar granites, but of a more gneissose structure, occur at Granite Island, at Canayaballi, on the Waini and Pomeroon rivers. The belts of granitoidal rocks, being more resistant to weathering than the gneisses, porphyries, and schists, usually give rise to ranges of low hills or to isolated rounded low hills, and where rivers have cut their courses across the belts of granite their occurrence is usually marked by the presence of rapids or cataracts. Large areas of the colony are occupied by quartz-porphyries, felsites, and schists. As a general rule these rocks yield comparatively easily to weathering agencies. It follows that the lower parts of the colony occupied by them consist of somewhat undulating land or plains. Again, in the elevated parts of the colony in which rocks of this group occur the surface is interspersed with rugged ridges and hills with tabular masses forming in some districts a rough grass-covered country with occasional patches of forest. The basal rocks of the colony are gneissose. The commonest variety of gneiss is a grey or pinkish grey granitite-gneiss, which in places changes into a white or light-pink aplite-gneiss, or occasionally to dark-grey or greenish-grey quartz-diorite-gneiss, or to a still darker coloured diorite-gneiss. This fundamental gneiss of British Guiana is regarded as the most important source of gold.

The variety and character of the rocks briefly referred to above would indicate that in a tropical country of such vast extent natural features of a striking character are likely to be met with. The courses of the principal rivers are interrupted by many cataracts and rapids, and the streams which rise in the high plateaus of the interior make their descent by numerous lofty waterfalls. The finest of these are the Kaieteur Falls on the Potaro River, with a total height of 741 feet. The plateaus themselves are terminated in many localities by massive wall-like cliffs of great height, with the characteristic structure of cliffs caused by the action of sub-aerial denudation on horizontal or slightly inclined strata. When the plateaus have been forced by intrusive rocks to great heights the sandstones of the district give rise to imposing mountains, the upper parts of which exhibit lofty precipices 2,000 feet high, as in the case of the Roraima Mountain. In other districts the rivers have cut deep valleys in the sandstone country; many of them, as the Potaro valley, are of surpassing beauty. Altogether British Guiana is a magnificent country. It would well repay further exploration, and it would be in the interests of science as well as of the further development of its undoubted natural resources if facilities could be provided to reach the vast interior lands of the colony.

Minerals of British Guiana.

The chief minerals hitherto exploited are gold and diamonds. The gold, as already mentioned, is found in the districts occupied by the Archaean rocks, but usually only in payable quantities near the intrusion of basic rocks. Gold is diffused through the mass of rock and is set free by gradual decomposition. It is afterwards accumulated in what are known as the auriferous gravels by the normal process of weathering and detrition. In some cases it is possible the placers have been enriched by solution and the re-disposition of the metal. Fissure veins are not common; but some auriferous veins exist in the Arakaka, Mazaruni, and Puruni districts.

The original source of British Guiana diamonds has not been fully ascertained. According to Harrison 'there are indications in some districts that they have been derived directly from the degradation of basic rocks; whilst in others, they may have been originally derived from such sources, whence they found their way by degradation and detrition of the rocks with the gravels in which they now occur'.[1]

Trinidad. While the general character of the formations in Trinidad is in some respects correlated with those of the northern islands, Trinidad geology may be regarded as largely South American. This is also exemplified in the fauna and flora. The position of the several strata in the geological scale is generally accepted as ranging from the lower Cretaceous to the middle Tertiary (Miocene). A considerable proportion of Trinidad is occupied by rocks of the latter age.

According to Wall and Sawkins, in the northern littoral range extending from east to west, from Point Galera to the Bocas Islands, the constituent strata consist of micaceous slates, sandstones, and shales. This formation, known as the Caribbean group, is met with also in the littoral chain of Venezuela. The central range (Older

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[1] The earliest publication dealing with the geology of British Guiana was a series of reports by Mr. C. B. Brown, F.G.S., and Mr. J. G. Sawkins, F.G.S., in 1875. Since then, from 1897 to 1907, Professor Harrison, C.M.G., F.G.S., Director of Science and Agriculture and Government Geologist, with the assistance of Mr. Frank Fowler, Commissioner of Lands and Mines, and Mr. C. W. Anderson, F.G.S., Government Surveyor, has made a careful investigation of the geology of the goldfields and diamond areas and published a comprehensive report with a series of coloured maps (London: Dulau & Co., 1908).

Parian Group) comprises an indurated formation of lower Cretaceous age; while the north-central and southern portions (the Newer Parian Group) consist of a considerable succession of limestones, calcareous sands, shales, clays, and marls of later date.

Principal rock-groups and their characteristics.

Caribbean Group. The chain of mountains forming the north coast facing the Caribbean Sea is composed of a large variety of rocks. The most prevalent are beds of mica-slate, sometimes appearing in layers of quartzose rocks separated by thin seams of mica. The mica possesses a peculiar glossy appearance, and presents numerous shades of white, green, red, and black. Quartzose slates frequently occur. Of sandstones there is a considerable variety, from fine to coarse-grained, some soft, others of the hardest consistency. Calcareous rocks are represented by two varieties, namely, crystalline limestone and compact limestone. The former occurs sometimes in massive beds, varying from white to blue in colour. Thinner beds from a few inches to several feet in thickness are also met with alternating with the slates and shales. The compact limestones form a portion of the Laventille Hills, near Port of Spain, and several of the islands, such as Gasper Grande and the Diego and Five Islands in the Gulf, where the limestone is quarried. In some instances there are caverns of considerable dimensions. One at Diego Martin has a considerable deposit of crystallized spar; another at the base of the hill at Oropuche is the habitation of the curious bird, the guacharo or diablotin. Several beautiful waterfalls and cascades occur. The best known is the Maraccas, which falls perpendicularly 340 feet. The cascade of Diego Martin in wet weather is very attractive. It occurs in mica schist, with some calcareous slates.

Old Parian Group. The only part of the coast where the strata of this group are exposed is at Point à Pierre, about three miles north of San Fernando. There is a much larger development in the interior immediately to the south and east of the Montserrat Hills culminating in the Carata Hill and Mount Harris. Limestones are rare. A peculiar indurated clayey stratum, 'argiline,' is extensively quarried for road-making at the hill of San Fernando, under the name of 'gravel'. Bituminous substances, semi-solid or more commonly liquid, issue from the soil at the base of the hill in several localities, and the springs rising in the gravel are also contaminated with an asphaltic oil and sulphuretted hydrogen which, according to Wall and Sawkins, tend to show that causes generating the formation of asphalt may have begun to operate even at the epoch of the formation of the older Parian rocks.

Newer Parian Group. This comprises a considerable succession of limestones, calcareous sands, shales, loose ferruginous sands, conglomerates, clays, and marls occupying the basins of the Caroni and Ortoire rivers as well as the larger portions of the central and southern hilly districts. So far as may be gathered from the fossiliferous contents 'they present a certain analogy with the Miocene fauna'. The five divisions or series of the group as arranged by Wall and Sawkins are as follows: (*a*) Nariva series, forming the substrata to the well-known red soils of the island. (*b*) The Naparima marls, conglomerates, and calcareous sands. (*c*) The Tamana massive limestones, which form the most definite stratum of the whole island. This can be traced, with only one or two interruptions, from near the western to the eastern coast. There is only one common coral (*Orbicella*) which also occurs in the Naparima marls. (*d*) Caroni or carbonaceous series: there is a lower or non-carbonaceous division and an upper or carbonaceous division. Seams of what is called Tertiary coal occur in this series. They are said to be numerous and varying from a mere carbonaceous film to seams of over 4 feet in thickness. This lignite coal has not yet been proved of commercial value. (*e*) Moruga or arenaceous series. This occupies the whole of the southern portion of the colony from Cedros near the Serpent's Mouth to Points Galeota and Mayaro on the eastern coast. The distinctive features are thick strata of massive sand, generally loose and pulverulent. Shales and shaly sands are numerous, also layers of lignite and lignitic shales.

According to Harrison and Jukes-Brown, the deposits of Trinidad included by Wall and Sawkins under the Nariva and San Fernando beds are probably of Eocene or Oligocene age; the Naparima marls are Miocene, while the Moruga series are probably of Pliocene and Pleistocene age. The Naparima marls consist of a lower division containing Globigerina and an upper division with Radiolaria and Diatomaceae, and are clearly of deep-sea origin.

Mineral resources. The mineral resources of Trinidad are considerable, and in the near future they will assume large importance. Limestone is fairly abundant in the northern and central portions of the island. Gypsum is extensively diffused, but the only deposit in quantity is a stratum of dense crystalline structure, near St. Joseph. Asphalt occurs in numerous localities. At La Brea is the world-famous Pitch Lake, a vast deposit of asphalt 127 acres in extent. The asphalt and oil industry of Trinidad will be dealt with later.

Barbados. There are no traces of volcanic rocks in Barbados. The older rocks in the north-east of the island, known as the Scotland series, are probably of Cretaceous age, while the oceanic and coral series belong to middle Tertiary or more recent deposits. The Scotland rocks consist of thick-bedded sandstones, coarse grits, bituminous sandstones, shales, and dark grey mottled clays with nodules of sandstone. The beds, which are much bent and broken, are estimated to be from 550 to 600 feet in thickness, but their base is nowhere exposed. Harrison and Jukes-Brown regard them as bearing a striking resemblance to the great series of sandstones and clays which underlie the Naparima series in Trinidad, both yielding asphalt and petroleum oils. Probably similar series exist in Venezuela and are portions of a vast Tertiary formation, which once extended over a large part of the south Caribbean region. Although the Cretaceous beds in Barbados are only exposed in the Scotland district, it has been ascertained that they underlie the oceanic and coral series ; in fact extend under the whole island. The oceanic series comprise the white earths and chalks immediately above the Scotland series. At Bissex Hill, at the base of the coral limestone and resting unconformably upon the oceanic series, there is globigerina marl. Some of the beds are purely silicious and consist of the skeletons of Radiolaria and Diatomaceae mixed with spicules of sponges. In the calcareous earths shells of Foraminifera are common. It is probable that the siliceous Radiolarian earth was formed in a deep basin at depths of 2,000 to 4,000 fathoms at a time when the Atlantic and Pacific oceans were united and the isthmus of Panama did not exist. The oceanic deposits are not largely exposed. They underlie the coral limestone at depths of 50 to 200 feet. The coral rock or reef limestones cover six-sevenths of the surface of area of Barbados, that is, 144 out of 166 square miles. The limestone area consists of a number of separate terraces or platforms built up as fringing coral reefs as the island rose slowly out of the sea.

Mineral products.

Among the mineral products of Barbados are soft oolitic freestones or ‘ sawstones ’ used for building purposes ; these harden on exposure to the air. From the more porous portions of the same beds large stone filters or ‘ dripstones ’ are made. The coral rock everywhere affords excellent material for burning into lime. The lowest chalky deposits of the oceanic series are capable of being utilized in cement making. Perhaps the chief mineral products of Barbados will eventually be its petroleum and asphalt deposits. A pitch-glance, ‘‘manjak,’ is exported in small quantities to serve as a basis of black varnishes. A scientific investigation of the petroleum deposits in Barbados has recently been completed, and it is probable that efforts will be made to develop these deposits with great advantage to the colony. On two occasions, in 1812 and 1902, volcanic dust from the Soufrière at St. Vincent was carried by air currents in the upper atmosphere in a contrary direction to the prevailing trade winds, and deposited at Barbados. Traces of the dust deposited in 1812 were recently found forming a thin black layer in the mud in cleaning out a pond near Bridgetown.

Windward and Leeward Islands.

As already indicated, most of the Windward and Leeward Islands, with the exception of parts of Antigua and Barbados, belong to the volcanic group, forming an arc of a circle extending from Saba southward to Grenada. They consist of masses of volcanic peaks and ridges dissected by deep gorges radially extending towards the sea. In some cases the peaks, as in Dominica, reach a height of 4,000 to 5,000 feet. There are practically no coastal plains in the volcanic islands: the only moderate slopes and flat areas are the reaches of the short valleys or fragments of low terraces. The foundations in most cases consist of old igneous rocks, covered by massive tuffs overlain by gravels and clays formed by the decomposition of igneous and other rocks. There are numerous indications of volcanic agencies still existing at Dominica, St. Lucia, and St. Vincent. A boiling lake was in eruption in Dominica in 1880 and a soufrière (literally, a sulphur mine) exists in the southern portion of the island. The term *soufrière* is often met with in the West Indies and is applied alike to volcanoes, like those of St. Vincent and Martinique, or to the numerous quarries of hot sand and boiling mineral springs, which are either the remains of ancient craters or minor eruptions from strata highly impregnated with volcanic elements. Another soufrière exists at Montserrat, and a third near the Pitons in St. Lucia. The famous Soufrière or volcano at St. Vincent was the scene of a terrible eruption in 1812, when the summit is said to have been blown bodily into the air. Two deep and rugged craters, the older and larger containing a small lake at a depth of 600 feet, with its waters impregnated with sulphur, remained until another series of violent eruptions took place on May 6, 1902, when about 2,000 lives were lost. A full account of these eruptions is given in a report by Dr. Tempest Anderson, F.G.S., and Dr. J. S. Flett, the Commissioners appointed to make investigation by the Royal Society of London (*Proceedings*, *Royal Society*, vol. 70, pp. 426 et seq.). As in the case of the eruption of 1812, the volcanic dust was carried by an upper current in a contrary direction to the trade wind, and a large quantity fell at Barbados. There was no flow of lava at St. Vincent, probably owing 'to the enormous amount of imprisoned gas and steam in the molten magma'. A similar terrible eruption took place on May 8, 1902, at the volcano on Mont Pelée in Martinique, when in an avalanche of incandescent ash St. Pierre, the chief town, and the whole of its inhabitants, numbering 30,000, were completely overwhelmed.

Antigua. Geologically Antigua consists of three regions of Tertiary age, namely, the limestone region of the north-east, the central plain, and the hilly or mountainous region of the south-west. Dr. Watts has given some attention to the subject, and the following contains a summary of his observations.

The limestone region consists of a succession of low hills, occupying the northern and eastern sides of the island. The geological age and succession of the various rocks of which they are composed have not been clearly worked out. They appear, however, to consist of a lower series of hard crystalline limestones of Miocene age, and upon these have been deposited limestones and sands of the Pliocene and Pleistocene periods. This limestone region has been subject to much denudation and reconstruction in the repeated upheavals and subsidences that it has undergone. At one time it occupied a much larger area, as is evidenced by the extensive outliers of limestone existing in various parts of the central plain, as at Belmont, Briggins, Bath Lodge, Seaforths, Lower Freemans, and many other places. The rocks of these outliers are in parts highly silicified, giving rise to the marine flint series of some writers. A series of thin beds of recent age, containing many land and freshwater shells closely allied to existing forms, is found in the upper part of the limestone series; these beds are to be found near

St. George's Church, and form a definite horizon on the flanks of the hills throughout the district.

The rocks of the central plain underlie the limestone series; they appear to consist of a series of mud-stones, sandstones, and grits of an estuarine character of Eocene age. In this series there occur abundant fossil woods, together with freshwater or brackish-water types of shells; these are highly silicified, giving rise to the freshwater flints of various writers. Fossil fish of an Eocene type have also been found. The fossil woods comprise a considerable number of forms of both monocotyledonous (palms) and dicotyledonous types. They have been but incompletely studied, and their relationships are very imperfectly known. These freshwater flints from their imperishable nature separate themselves by weathering from the softer rocks with which they are associated, and give rise to surface deposits of flinty blocks, which are so numerous in the central parts of the island as to be largely used for road-making. Some of the silicified fossils of tree trunks are of considerable size. A good example may be seen in the geological gallery of the British Museum of Natural History.

Extending right across the island from St. John's Harbour to Willoughby Bay, there exists a series of deposits of sands, gravels, and pebbles, probably of recent age, indicating that within comparatively recent times the sea flowed right across the central plain, when there probably existed an archipelago of small limestone islets, where the limestone area now is, and probably a higher rugged island on the south-western side of the channel, a condition somewhat similar to that now existing in the neighbouring island of Guadeloupe. As a result of the geologically recent submergence, the water existing in the rocks of the central plain is decidedly brackish, so that although existing in quantity, it is useless for economic purposes, while the trace of salt in the surface soil gives rise to some agricultural problems of difficulty in limited areas.

The third or mountainous district of the south-west is commonly, but erroneously, described as volcanic. It consists of an extension of the Eocene beds of the central plain which have been upheaved and altered by volcanic action. This volcanic activity was not so violent as to give rise to extensive lava flows or beds of ash, but served to distort and elevate the low-lying beds of the central plain into rugged masses in the south-west. There are evidences of lava flows in the neighbourhood of Dimsdale Estate, near English Harbour, and at other places in this locality. Intrusive masses of andesite are to be found at Drew's Hill, and scattered throughout the whole region from the central plain to the southern and western coasts.

Dr. Watts adds that the geology of Antigua is of exceptional interest, and its careful and systematic investigation would probably do much to elucidate what is obscure in the general geology of the West Indies.

Bahamas. The Bahamas consist of a large number of scattered coral islands, or groups of coral islands, stretching from the south-east of Florida in a course nearly parallel to Cuba but outside and to the north of the main chain of the West Indian Islands. The long, narrow, and low character of the islands has suggested that their initial formation may have been due to the large quantities of sand and detritus brought out from the Gulf of Mexico by the Gulf Stream. With the check given by the north-easterly trade winds it is possible this material may have been gradually accumulated over the areas where the islands now stand. There would thus be laid a foundation for coral and other growth, and eventually land would appear. Support is given to this view by the fact that the islands have evidently been built up on the side on which the wind would have helped the sand and débris to accumulate. Dolley mentions that fossil corals of recent types are found much above high-water mark, and that large caves exist with their floors above tide-level, together with many other evidences of land elevation. Many of the islands show the formation of aeolian or sub-aerial rocks in progress, while in the great bights dividing Andros

Island and elsewhere the deposition of Foraminifera has been so great that former channels and sponging grounds have within recent years become too shallow for approach. While in some localities the Bahamas seem to be extending, changes in the configuration of some of the islands are going on due to erosion and local subsidences owing to the undermining action of the waves.

Bermuda. Bermuda consists of a singular agglomeration of small islands and submarine sandhills and coral reefs, forming an irregular ring about 22 miles in length and 3 miles in breadth. The highest point of Main Island is nearly 240 feet above the sea. In the Report of the Challenger Expedition it is pointed out that the Bermudas differ from an ordinary atoll, as there is no well-defined lagoon, and the land is higher than is usual in coral islands. It is probable that the group is situated on the summit of a huge cone with a wide base rising from the submerged plateau of the Atlantic. The coast is either rocky, presenting an irregular surface of weather-worn calcareous limestone, or sandy, the sand being blown up into dunes covering extensive tracts. In the interior hollows are peat bogs or marshes of considerable size. The islands may be regarded as wholly built up of coral limestone of varying degrees of hardness. There are numerous caves. One remarkable feature is the moving coral sand, or sand glacier, at Elbow Bay on the south side of the main island. In the shallow valleys there is a moderately rich red soil, which is well cultivated. There are no springs, and the inhabitants depend for their fresh water on the rainfall collected in tanks and reservoirs.

Hydrography

Jamaica. Jamaica, 'the isle of springs,' possesses numerous rivers and watercourses. Nevertheless there are areas inland singularly deficient of water. As the mountain ranges trend east and west, with two exceptions, the rivers flow north and south. Their course is necessarily short and steep. In the rainy seasons they become formidable torrents carrying everything before them. The chief rivers are the Plantain Garden River, flowing east, and the Montego River, flowing west; the Rio Grande draining the northern slope of the Blue Mountains is one of the finest. The Black River in Westmoreland is practically the only navigable river in Jamaica; boats of considerable size can ascend a distance of 25 miles. In the central districts some of the rivers disappear into sink-holes in the limestone formation. There are several picturesque waterfalls and caverns.

British Honduras The river system of British Honduras is extensive and serves as the natural highway into the interior. The Hondo and New rivers flow in a northerly direction. The former is the boundary between the colony and Yucatan. No less than 16 streams large enough to be called rivers descend from the interior mountains to the sea between the Hondo and the southern boundary of the colony. The Old or Belize River rising in Guatemala territory and crossing the frontier at the Cayo is the most important waterway in the colony. It is navigable for 'pitpans' (flat boats) for about 120 miles. The Roaring Creek Falls, between two precipitous cliffs, are of great natural beauty. The Sibun River rising in the Cockscomb Mountains passes through a rich agricultural country. The Manatee River has remarkable caves and the Sittee has numerous rapids. The Sarstoon River forms the southern boundary between British Honduras and Guatemala.

British Guiana. As draining a portion of a vast continent the rivers in British Guiana are numerous and most imposing. The Essequibo with its several tributaries, of which the Cuyuni and Mazaruni are the most important, drains more than one-half the total area of the colony. The estuary of the Essequibo contains three extensive islands; one, Wakenaam, is nearly as large as Barbados. The Berbice River, next to the Demerara, is second in commercial importance, while the Corantyne, second in size, forms the boundary between British and Dutch Guiana. It is unfortunate that all the large rivers in British Guiana, above tidal influence, are obstructed by numerous rapids, cataracts, and falls that render their

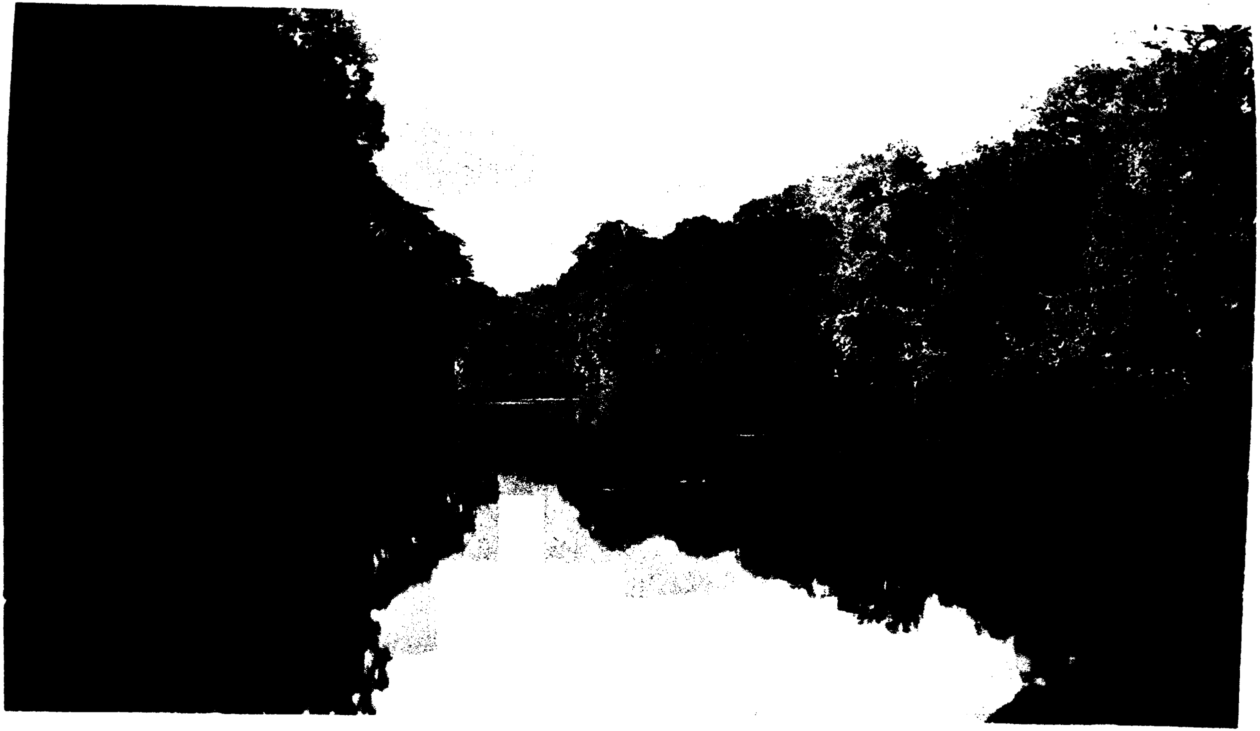

PLATE XXIX. POTARO RIVER (UPPER REACHES), BRITISH GUIANA

(West India Committee; Phot. F. V. McConnell)

PLATE XXX. VIEW OF SCOTLAND FROM CHIMBORAZO, BARBADOS

(Phot Government of Barbados, per West India Committee) navigation both difficult and dangerous. Between some of these obstructions there are intervals of smooth water of varying extent, where steam launches afford access to some of the goldfields of the interior. The Demerara River has sufficient depth of water on the bar to allow of the passage of ocean steamers. Georgetown, the capital, has been established on its right bank, where the river has a width of three-quarters of a mile and furnishes a safe harbour.

Trinidad.

The extensive plains of Trinidad are traversed by numerous rivers and rivulets and the flanks of the mountains everywhere are drained by innumerable streams. The ranges along the northern coast give rise to several affluents of the Caroni River flowing westerly into the Gulf of Paria, and into the Oropuche River flowing easterly into the Atlantic Ocean. Other moderately large rivers draining the east coast are L'Ebranche and the Ortoire rivers. The latter is the largest river in the colony. On the west coast south of the Caroni are several rivers rising in the Montserrat Hills, also flowing into the Gulf of Paria. Between the Cipero and the Aripero rivers lies the extensive Oropuche or Grand Lagoon, intersected by channels, which expand at intervals into small lakes covered with reeds, rushes, and aquatic trees. Most of the Trinidad rivers are obstructed by bars and shallows. In the dry season, according to Verteuil, in some of the rivers, as, for example, the Guatero, the salt water reaches a distance of 18 miles inland.

The lesser islands.

In the northern islands, owing to the steepness of the mountain slopes and the short distance to the sea, the few rivers are rapid and easily flooded in the rainy season. In the dry season they are mere streamlets. None of them is navigable. In Barbados, Antigua, Bermuda, Nevis, and Anguilla there are practically no rivers worthy the name. In the limestone formation at Barbados numerous underground streams occur with outlets on the sandy beach. At Dawlish, near the Crane Hotel, there are fresh- and salt-water baths closely adjoining. Excellent water is pumped from the underground streams for domestic and other uses. Owing to the abundant supply of such water, Barbados, although thickly populated (1,100 to a square mile), is very healthy.

Climate and Rainfall

As may be expected from the scattered character of the several colonies, extending over 45 degrees of longitude and 25 degrees of latitude, the conditions affecting the climate and rainfall of the West Indies are subject to considerable variation. With the sole exception of Bermuda the whole area is within the tropical zone, whose chief characteristics are a continuous high temperature and a heavy rainfall. Where high lands exist, as in the interior of British Guiana, British Honduras, Jamaica, and some of the Lesser Antilles, there are sub-alpine conditions accompanied by a lower night temperature and usually a heavier rainfall.

Jamaica. Jamaica has a great variety of climate. The mean temperature at sea-level at Kingston is 78·8° F., rising to 87·5° and sometimes 90° in the daytime and falling to 70·8° at night. As the temperature falls about 1° for every 300 feet of elevation, it is possible, in a few hours, to reach in the Blue Mountains a cool and delightful climate. The mean annual rainfall varies throughout the island from about 34 inches in the low lands to as much as 196 inches on the northern slopes of the Blue Mountains. Mr. Maxwell Hall has devoted close attention to the meteorology of Jamaica, and his publications furnish complete information on the subject.

British Honduras. Though situated within the tropics, the climate of British Honduras in some respects may be regarded as of a sub-tropical character. The maximum shade temperature at Belize is 90° F. and the minimum in the winter months is 62°. Sea-breezes prevail during the greater part of the year. The average rainfall at Belize is 81·48 inches. From the middle of February to the middle of May is usually the dry season. During the remainder of the year there is some rain during every month. The heaviest rains occur during the months of September, October, and November, when about one-third of the total rainfall takes place. Hurricanes and cyclones seldom reach the coast.

British Guiana. In British Guiana the climate, for a continental climate, is hot, but not unhealthy. The mean maximum temperature in Georgetown is 85·9° and the mean minimum 75·4°. The striking feature is the small amount of variation. The difference in the mean maximum temperatures of the hottest and the coldest months is only 3·2° F.; while the variation between the mean minimum temperatures is still less, being only 1·6°. December to March are usually the coolest months, while August, September, and October are the hottest. The average annual rainfall in Georgetown over eighteen years is 92·24 inches. The heaviest annual fall is 135·4 inches, and the lowest 52·70 inches. The county of Berbice has usually the lowest rainfall and Essequibo the highest.

Trinidad. The climate of Trinidad in many respects resembles that of British Guiana. The mean maximum temperature at St. Clair Experiment Station, near Port of Spain, during six years, has ranged from 85·9° to 87·2° F.; and the mean minimum temperature from 69·3° to 69·9°. August is usually the hottest month and January to March the coolest. The average rainfall at St. Clair's during six years has been 64·92 inches.

Barbados. Owing to its easterly position Barbados enjoys the full benefit of the invigorating trade winds, and the climate is justly regarded as one of the healthiest. Sir Charles Lucas justly remarks that the Barbados climate is better suited to Europeans than that of any other part of the Western tropics. There they can settle, live, and thrive. Barbados is the most striking exception to the rule that the tropics must be peopled by others than the natives of northern Europe. During a period of ten years the average maximum temperature was 84·2° F. and the average minimum 75·8°. The mean average temperature was 79·9° and the average range 17·5°. January to March are dry and cool. Some rain falls in May and June. July is usually the wettest month, and July to October, owing to the absence of the trade winds, are the hottest months. The average rainfall based on observations for sixty years is 62·5 inches. The heaviest rainfall was 91 inches in 1901 and the lowest 41 inches in 1863. It is claimed that there is evidence of periodicity in the Barbados rainfall.

Grenada. At Grenada the climate in the dry season is delightful. In the wet season, as in all other tropical islands, it is damp and hot. But for six winter months, say from December to May, it is excellent, and it is healthy at all times. The average annual rainfall at St. George's for fourteen years is 79 inches, and the highest and lowest readings of the thermometer for five years are 89·8° F. and 67·8°, respectively, the average mean temperature being 78·8° in the shade. The rainfall in other parts of the island is much greater; at the Grand Etang, in 1908–9, it was 168·68 inches.

St. Vincent. As in Grenada, the climate of St. Vincent in the dry season is very pleasant. In the wet season, and especially from August to November, it is hot, but not at all unhealthy, and fever is almost unknown. Taken altogether, St. Vincent is one of the healthiest islands in the West Indies. The average rainfall for nineteen years, measured at the Botanic Station near Kingston, is 105·67 inches; during the year 1911, 87·11 inches were recorded, but this was an exceptional fall. The highest reading of the thermometer in 1912 was 90° F., and the lowest 68°; the mean monthly temperature in the shade was 78°.

St. Lucia. The climate of St. Lucia differs very little from that of St. Vincent, but there is usually less rain. The island is healthy in the open country. Some cases of intermittent fever occur in the deep shut-in valleys on the western coast. The local rainfall near Castries is about 79 inches per annum. The mean annual temperature is 78° F.; the mean maximum 84°, and the mean minimum 71°.

Dominica. Dominica is very mountainous. The average rainfall during 1912 at thirty-four stations was 98·94 inches; the distribution of the rainfall is indicated by the following averages: twelve Leeward Coast stations 69·75 inches, three Windward Coast stations 95·94 inches, thirteen inland stations 135·71 inches. The mean annual temperature in Roseau is 79·9° F.

The island of Montserrat is considered to be as healthy as Barbados. The average rainfall in 1912 was 41·33 inches (average of seventeen stations) and the mean temperature was about 80° F. There is no malaria in the island.

Antigua and adjacent islands.

Owing to the absence of rivers, the paucity of springs, and the almost complete deforestation of the island, Antigua is subject to frequent and severe droughts. The average rainfall is 45·6 inches, but the variation from year to year is considerable. Very similar remarks apply to Nevis and Anguilla, but less so to St. Kitts. The climate in these northern islands is generally healthy. The average annual temperature is about 79° F. The winter climate is pleasant. The Virgin Islands are constantly swept by the trade winds and the shade temperature varies between 65° and 86°.

Bahamas.

The northern islands of the Bahamas group lie just outside the tropics. The climate is delightful in the winter, when the range of the thermometer is from 70° to 80° F. In the summer, which is the rainy season, the thermometer ranges from 75° to 85° F., but the heat is tempered by cooling breezes. Occasional hurricanes occur in the summer season. The average rainfall at New Providence is about 45 to 50 inches. Numerous visitors from the United States arrive during the winter months.

Bermudas.

Owing to their geographical position the Bermudas have a climate of a very equable temperature, varying in the colder months from 55° to 70° F., but the heat in the summer months is very oppressive on account of the excessive moisture of a prevailing tropical wind. The winter temperature is about equal to the mean summer temperature of the British Isles, and the mean annual temperature reaches 70·9° F. On the whole the winter climate is agreeable, although storms are not infrequent. Bermuda is a favourite winter resort for Americans and Canadians seeking to escape the rigours of the climate on the continent. Large hotels have sprung up and a considerable amount of money is expended in the islands.

Fauna

Wallace states: ‘The West Indies are less clearly neotropical than the mainland, their poverty in mammals, as well as in most groups, being extreme. The resident birds, however, comprise neotropical genera—a fact which decides the region to which the islands belong.’

Jamaica. In the Greater Antilles Columbus found no quadruped sufficiently large to attract attention except a small dog, domesticated by the natives, and conies. The short-tailed cony is still met with in the rocky recesses in the mountains of Jamaica. Pigs introduced by the Spaniards in the sixteenth century are occasionally found wild in the Blue Mountains. The guinea-fowl from West Africa and the East Indian mongoose are naturalized. Alligators, numerous lizards, and three species of snakes are represented in the Jamaica fauna. The native and migratory birds number 189 species. Of these, 43 species are believed to be peculiar to the island. The John Crow vulture, from its size and soaring flight, is always visible. The song of the Antillian mocking-bird equals that of the English thrush. There are three species of humming-birds, eight species of doves, and nineteen species of ducks. The manatee and turtle inhabit the coast waters. Fish are abundant. The wandering black crab of the Blue Mountains is considered a delicacy. Jamaica is remarkable for the large number of species of Lepidoptera and other insects, and the fewness of the individual members actually seen. Land and freshwater shells are numerous and interesting.

British Honduras. British Honduras on the mainland possesses a distinct fauna in the puma or lion, the jaguar or tiger, the ocelot or spotted tiger-cat, the coyote or wolf-like fox, and the peccary or warree. Other animals found in the colony are red deer, tapir, the iguana, small ant-eater, the quash, armadillo, squirrel, gibonet, and conies. Alligators of large size infest most of the inland lagoons. Of monkeys there are several species. Of bird life there is an abundance. The wild turkey is now met with very rarely; the handsome curassow is as large as a turkey. Other birds are the white egret, toucans, the guan, and such raptorial birds as the John Crow vulture, the osprey, and hawk. Snakes, scorpions, and numerous Lepidoptera and flies are abundant.

British Guiana.

As in the case of British Honduras the fauna of British Guiana is of a distinctly South American character. The largest mammals are the tapir or maipouri and the manatee. The guinea-pigs or cavies range in size from the adourie, hardly larger than a rat, to the great water-haas, or capybara, which may be compared to a small pig. Relics of the ancient fauna are represented by the marsupial opossums. The sloths are also of an ancient type. The monkeys are fairly common, among them the howling baboon. Bats are everywhere. The jaguar is the largest and most formidable of the felines. The number of species of birds in British Guiana is stated to be greater than in the whole of Europe, yet they are rarely seen in large numbers. The largest birds are the stately negro cop, or jabiru, and the fierce harpy. The hoatzin, or Canje pheasant, has claws on its wings in the young state and possesses eye-lashes. Of game-birds there are ducks, plover, pigeons, snipe, and spur-wing. The large alligator, or cayman, is found in the upper waters of the Essequibo and two smaller species are common on the coast. Snakes are fairly common; about half a dozen are poisonous. Tree-frogs are numerous. The rivers swarm with fish. The four-eyes scuttles over the mud as active as a lizard, and another fish curiosity is the little armoured passar, common in the trenches. The electrical eel is found in the interior waters. Insects are exceedingly numerous. The local museum possesses a collection of 20,000. The most interesting are the Mantidae (praying mantis), of a beautiful green colour; and the Phasmidae (walking leaf insects). Some of these have wing covers so closely resembling the leaves of plants that they are easily mistaken for the vegetable products around them.

Trinidad and other islands. In the fauna of Trinidad are numerous animals not represented in the neighbouring islands. The large howling monkeys and a small whitish ape are common. The vampires attack horses and very occasionally oxen and even swine. The ocelot and the wood-dog are the chief carnivores. A small opossum is a destroyer of poultry. The agouti (one of the Cavidae) is present ; its flesh, and that of its congener, the lapa or capa, is regarded as a delicacy. The armadillo and ant-eater, the peccary, and a small deer are also present. The manatee is very occasionally met with and the rorqual, allied to the common whale, is pursued for its blubber. Among birds the black corbeau and the crested gavilan are the largest of the feathered tribe. There are nineteen species of humming-birds. A nocturnal goat-sucker, the guacharo or diablotin, inhabits caves. There are several parrots and parakeets. The guan or penelope, the largest game-bird, is the size of a domestic fowl. Many migratory birds, such as the golden plover, numerous ducks, sandpipers, curlew, and snipe, are autumn visitors. Some of the snakes, as the mapepire, cascabel, and the coral, are poisonous. The boa-constrictor is occasionally met with in the interior woods. The eastern birds of paradise have been successfully introduced into the island of Little Tobago in recent years. In the presence of a native monkey, of the agouti, and of the armadillo or tattou, the fauna of Grenada approaches that of Trinidad. It has no venomous snakes. The tarpon or *grand-écailles* affords good sport both in Grenada and Trinidad.

The Barbados and St. Kitts monkey (*Ceropithecus callitrichus*), now established in those islands, was introduced from Sierra Leone in slavery times. The English hare has been naturalized in Barbados for seventy years. The East Indian mongoose, introduced to Jamaica in 1872, to destroy rats in corn-fields, is now common in all the smaller islands. It has become very destructive to ground-hatching birds, lizards, and domestic poultry. A handsome parrot (*Amazona Guildingi*) is peculiar to the island of St. Vincent ; and another rare parrot (*Chrysotis*

Augusta) is found only in Dominica. Some birds, as the burrowing petrels of Jamaica and Dominica, are probably extinct. The solitaire of Jamaica and the soufrière bird of St. Vincent, inhabiting mountain forests, are possessed of a singularly sweet note. Of eighty-two species of birds recorded at Barbados only fifteen are resident; the remaining sixty-seven are birds of passage or casual visitors. St. Lucia shares with Martinique in the presence of the venomous snake known as Fer-de-lance. In the case of St. Lucia it is said to be kept in check by the mongoose.

Vegetation

Jamaica.

The sea-shore is often lined with extensive groves of mangrove and button trees (*Conocarpus*), with the seaside grape on sandy dry banks, associated with the goatsfoot (*Ipomaea*), prickly pear, and the nickar tree (*Guilandina*). The coco-nut palms form a characteristic feature of many portions of the coast. The woodland vegetation of Jamaica, on the lower hills and savannas, with an annual rainfall of thirty to fifty inches, includes several acacias, braziletto (*Peltophorum*), cashew (*Prosopis*), clammy cherry (*Cordia*), dogwood (*Piscidia*), ebony, fustic, lignum vitae, silk cotton, yoke-wood (*Catalpa*), locust, logwood, and gru-gru palm. The giant cotton-tree (*Eriodendron*) is one of the characteristic arboreal features of the island. Further inland, reaching to an elevation of 3,500 feet, intersected with valleys and slopes with an annual rainfall of seventy to ninety inches, the vegetation is of a more luxuriant character, and includes the West Indian walnut or cabbage bark (*Andira*), the commercial bitter-wood (*Picraena*), the broad leaf (*Terminalia*), West Indian cedar (*Cedrela*), horse-wood along the banks of streams, mahoe, mango, white bullet-tree (*Dipholis*), the St. Ann's yacca (*Podocarpus*), mahogany, maiden plum, and soap-wood. Above 3,500 feet, with a rainfall of ninety to one hundred inches, the vegetation partakes of a somewhat sub-alpine character, and the principal trees consist of juniper cedar (*Juniperus*), mountain guava, mountain zebra-wood (*Eugenia*), blood-wood, fiddle-wood, a holly (*Ilex obcordata*), soap-wood, and alligator-wood (*Guarea*). After the May rains the vegetation everywhere in the West Indies is of a singularly attractive character. There are numerous flowering trees and shrubs, majestic palms, and feathery bamboos, with a grand background of extensive forest growth in all shades of green.

The Jamaica ferns are abundant and most attractive. Within a comparatively small area (4,913 square miles or twice the size of Lancashire) there are 44 genera and 500 species as compared with 19 genera and 44 species in the British Isles. Ferns are specially abundant in wet woods in the interior, and probably four-fifths are to be met with in the Blue Mountain region. The orchids are of considerable interest from the fact that quite a number of species are not found elsewhere. The total number of species is 194, of which 73 are confined to Jamaica and the Lesser Antilles; 40 occur both in Jamaica and Trinidad. A remarkable feature of the Jamaica flora, as it now exists, is the immense number of introduced plants that are naturalized or cultivated. Probably no other area in the tropics contains so large a collection of valuable economic plants brought together and flourishing as in their own homes. Mention may be made of a few of the introduced plants. The banana was introduced from the Canary Islands by Columbus on his second voyage, the sugar-cane was brought later by the Spaniards, but the Bourbon variety was brought from the South Sea Islands by Captain Bligh in 1796. Coffee was introduced in 1718. The mango, now so extensively established everywhere in the West Indies, was brought to Jamaica in 1782. The plentiful and free-growing logwood, which has proved a continued source of wealth, was introduced from Honduras by Dr. Barham, in 1815. The seeds of the valuable guinea-grass, on which the success of the numerous grazing pens depends, was accidentally introduced from West Africa as bird food in 1745. Cacao is native of Central America. The shaddock or pumelo was intro-

PLATE XXXI (*a*). CHARACTERISTIC VEGETATION IN JAMAICA
(Phot. West India Committee)

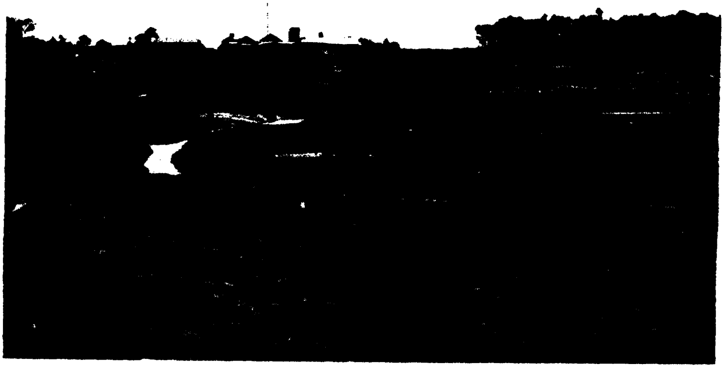

PLATE XXXI (*b*). PITCH LAKE, TRINIDAD
(Phot. Permanent Exhibition Committee of Trinidad and Tobago,
per West India Committee)

PLATE XXXII. LAYOU, ST. VINCENT, LEEWARD COAST (ARROWROOT AND COTTON CULTIVATION)

(Phot. Government of St. Vincent, per West India Committee) duced from China by Captain Shaddock; hence its name. Oranges, lemons, and citrons were introduced from southern Europe. The only tree native of Jamaica which is of commercial value is the pimento (*Pimenta officinalis*). This is spread by means of birds, who drop the seeds under the shade of bushes and trees in the neighbourhood. The total area of the forest lands, including those of secondary growth, in Jamaica is estimated at 1,230,000 acres.

British Honduras. A prominent feature in the rich tropical vegetation of British Honduras is the presence of a pine, extending in places down to the coast. It is probably the same species (*Pinus cubensis*) as that occupying similar situations in the Isle of Pines off the south coast of Cuba. The pine and the pimento palm are the dominating trees on the pine ridges forming the watersheds between the river valleys. In some localities the ordinary pine-ridge vegetation gives place to groves of oak (probably *Quercus virens*). The Cohune ridges, between the pine ridges and the rivers, are so called in consequence of the predominance of the noble Cohune palm (*Attalea Cohune*). Each single bunch of fruit of this palm weighs about 280 pounds, and contains over 2,000 nuts—each the size of a hen's egg. Mahogany, cedar, and logwood abound in the interior forests, and the cutting and export of the timber of these and other trees, for a long period, has been the main staple of the colony. A native rubber tree (*Castilloa elastica*) yields central American rubber. Chicle gum is obtained from the naseberry tree (*Achras Sapota*).

British Guiana. The coast of British Guiana, within reach of the tides, is covered by the white mangrove or courida. There are also the red and black mangrove. On sandy banks are the seaside grape, mahoe, and the olive-leaved bontia. Beyond the coast are flat grassy savannas, and in depressions with swamps thrive such palms as the eta (*Mauritia*), troolie (*Manicaria saccifera*), the manicole (*Euterpe edulis*), the giant marsh ferns (*Acrostichum aureum*), and numerous reeds and coarse grasses. Further inland are sand reefs with stretches of wallaba trees and on the hill slopes the much-sought-for greenheart (*Nectandra*). In the valleys and along the river margins, amongst palms and other forest growth, the mora tree is conspicuous. If we ascend one of the great rivers in the lower reaches, we find, acting as an advance guard in defending their banks, masses of the gigantic arum (*Montrichardia*) eight to ten feet high ; next come tall water-loving trees and palms, draped with bush ropes and creepers, and further inland the massive forest growth of centuries. In marked contrast to these, extending miles inland, is the sparse vegetation of the sand reefs. The latter in past ages formed the coast line of the colony. The chief characteristic of the vegetation of British Guiana, so graphically described by Rodway, is ' altitude and size '. The trees are tall, the leaves broad, and the flowers immense. The forests cover about six-sevenths of the area of the colony. The forest products so far utilized are balata, gum animi, and rubber. Only certain of the more accessible districts have yet been tapped with the view of exporting timber. The chief timber trees are mora, greenheart, wallaba, and crab-wood. The last is excellent for all kinds of furniture. The existence of rapids and falls on all the great rivers, by obstructing navigation, prevents the vast and valuable forests of the colony from being fully utilized. The total value of the timber, shingles, firewood, and charcoal exported from British Guiana in 1912 was £17,139.

The services of a forestry officer has been secured in recent years and a general report on the forests of the easily accessible districts of British Guiana was issued in 1912. This review of the distribution and character of the forests, of the woods and forest-products most commonly exploited, of the bullet or balata trees and methods of tapping, of the occurrence of latex-producing trees likely to be useful for rubber purposes, and the methods adopted for the protection of the forests is a valuable contribution to the forest literature of the West Indies.

Trinidad. In many respects, as in the presence of the bullet and mora trees and the timit or troolie palm (*Manicaria*), the flora of Trinidad closely resembles that of the mainland of British Guiana. There are, however, many species that are also found in the northern islands. Extensive mangrove swamps exist on the western shores. The vegetation generally is of a distinctly tropical character, with forests of lofty trees. Those on the margin or in the open country are covered with lianes or bush ropes and masses of epiphytes. The wide-spreading branches of the silk cotton and saman trees are favourite places for the growth of tillandsias or wild pines, numerous climbing aroids, orchids, and the pendulous cord-like stems of *Rhipsalis*.

In addition to the forest areas there exists in the central and southern districts of Trinidad a considerable extent of natural savannas which exhibit a vegetation of their own. This consists of coarse grasses, sedges, and scrubby growth of stunted chapara trees (*Curatella*) and bois sang (*Vismia*). The soil, composed of quartzose gravel and sand, is generally poor in quality. Near the coast some of the savannas are periodically inundated, others are dry plains or plateaus as at Icacos and Couva. Several forest trees, such as the poui (*Tecoma*), roble (*Platymiscium*), and the immortel (*Erythrina umbrosa*) brighten the landscape with their yellow, pink, and red flowers. Amongst palms the more notable are the stately cocorite (*Maximiliana*), the tall, columned moriche (*Mauritia*) and the palmiste (*Oreodoxa*), the prickly gru-gru (*Acrocomia*), and the gri-gri (*Martinizea*). The climbing *Desmoncus* is the nearest ally of the rattans of the East. The principal timber trees are bullet or balata (*Mimusops globosa*), mora, carapa or crab-wood, cedar, and locust. The bullet-tree is not largely utilized for the production of commercial balata, as in British Guiana. The export of native balata in 1912 was of the value of £177. The transit trade in balata from Venezuela and British Guiana was of the value of £476,861. Since the establishment of a forestry department in Trinidad in 1908, 266 miles of forest reserves have been demarcated and 85 acres of new plantations started.

Windward and Leeward Islands.

With the exception of St. Vincent and Dominica there are comparatively limited areas of the original forest now remaining, and even these are being gradually reduced. Owing to the generally precipitous character of the coast, there are few mangrove swamps. The coast vegetation consists of the low growth of the turpentine tree (*Bursera gummifera*), white cedar (*Bignonia leucoxylon*), the manchineel, seaside grape, and mahoe. Where exposed to the full force of the trade winds the forest growth is stunted and wind-swept. Inland from the coast region, and reaching to elevations of 1,500 feet, there are scattered patches of indigenous trees with the poisdoux (*Inga*), the angeleen (*Andira inermis*), the bay-rum tree (*Pimenta acris*), locust, loblolly, galba, fiddle-wood, with an occasional bullet-tree (*Dipholis*). On the moist high ridges *Weinmannia*, angelica (*Sciadophyllum*), mountain guava, and several species of *Myrtus* and mountain cabbage palms are met with. In sheltered situations and ravines are numerous tree-ferns, climbing vines, and ground vegetation of mosses, Peperomias, begonias, and shade-loving ferns. On hilly slopes denuded of trees are tangled masses of a hardy fern (*Gleichenia*) with coarse grasses and cyperoids. On dry rocks inland, and often overhanging the sea, are numerous Agaves, Furcraeas, Tillandsias, and Pitcairneas. *Agave Kerrato,* with its erect pole surmounted by clusters of yellow flowers, is a striking object in the spring months. In dry districts in Antigua, Barbuda, St. Kitts, and the Virgin Islands the vegetation is largely comprised of scrubby crotons, spiny acacias, the inkberry (*Randia*), Turk's head cactus, and coarse grasses. The more common palms are the gru-gru (*Sclerocarpas*), several thatch palms (*Thrinax*), and the wild coco-nut (*Cocos amara*). The Dominica flora presents a marked exception to the arid conditions existing in the northern islands. It is particularly rich in palms, ferns, and shade-loving plants. At Barbados the small-leaved mahogany sows itself spontaneously in certain localities, and, if not kept in check, it and the white cedar would in process of time cover the whole island. An intelligent and careful treatment of the remaining forest areas in the Windward and Leeward Islands would undoubtedly have a beneficial effect in conserving the water-supply and in maintaining a moist atmosphere favourable to the growth of the chief staples. At Grenada a forestry board has been formed. Some efforts in the same direction have been made at St. Kitts and Montserrat. An Arbor Day movement was started by the Imperial Department of Agriculture in 1902 for the encouragement of tree planting. The results have been successful, both directly and indirectly. More attention is given to the selection and cultivation of specimen trees for ornamental and general purposes. In schools it has been inculcated that 'trees tend to preserve water in springs and rivers, preserve soil from floods, temper the climate, protect birds, yield fruits for man's enjoyment, provide material for his work and fuel for his fire, and above and beyond all make the beauty of a country'.

Barbados.

Barbados is so extensively occupied with cultivation that the original trees are found in few localities. Schomburgh, in 1847, described one such locality as follows: 'Turner's Hall Wood, a remnant of the tropical forest, clothes a ridge or spur which stretches from the semicircular cliffs to the north-east; it consists almost entirely of locust, cedar, fustic, and bully trees: some of these trees are of considerable height, and approach in size those of the equatorial forest. The lover of nature can only indulge the hope that this relic of the former forest may be kept sacred, and may not fall a sacrifice to the all-engrossing sugar-cane.' Turner's Hall Wood still exists, thanks to the intelligent interest taken in it by the owner and his representative in the island. Barbados is the only colony where direct encouragement is given to the systematic planting of trees. 'A bounty of twenty shillings for each acre for seven years is given to the owner who plants his land in that way. Also, land exceeding one acre in extent, planted with mahogany trees in the manner specified in the Preservation of Trees Act, No. 1 of 1875, is exempt from all taxation.' Inspectors are appointed under the Act whose duty it is to report annually upon the condition of the trees. The reports of five inspectors were published in the *Official Gazette* of February 27, 1905. These show that in five parishes inspected there were about 400 acres of land planted, cared for, and protected as required by the Act. The trees planted are chiefly mahogany, but white-wood (*Tecoma*), fiddle-wood, manchineel, and several others are extensively planted. The landscape in Barbados is much improved by the presence of these trees ; and when they are planted in groups around the residences dotted about on the sugar estates they supply grateful shade and add to the health and comfort of the inhabitants.

Bahamas. The flora of the Bahamas is almost wholly maritime, yet a few species occur that have not been found elsewhere. It is also Cuban in character, and as many as 129 species reach southern Florida. Specially noteworthy among the plants peculiar to the Bahamas is *Pinus bahamensis*. It occurs in New Providence and several of the other islands. It is a very distinct species with leaves (in clusters of three) a foot long. A curious feature in the flora, noticed by Eggers and Hitchcock, is the existence of hairy and smooth varieties of the same species growing intermixed.

Bermuda. The all-pervading cedar (*Juniperus*) is the chief indigenous tree of Bermuda. Its associate, the palmetto palm (*Sabal*), is probably endemic. Other endemic plants are a composite *Erigeron*, Lefroy's *Statice*, an iris (*Sisyrinchium*), *Carex bermudiana*, and three ferns. The only orchid found in Bermuda is a terrestrial *Spiranthes*. The Bermuda flora is of comparatively recent derivation. It is not, as supposed, of purely West Indian origin ; but according to Helmsley was partly derived from the West Indies, and from the region of south-eastern North America, where the West Indian and North American types of vegetation overlap each other. In a flora of

326 species there is a probable indigenous element of 144 species. The latter are made up as follows: dicotyledons 85, monocotyledons 35, and vascular cryptogams 24 species. There are several introduced plants prominent in the present vegetation. The lantana (sage bushes) are spreading with such vigour as to threaten the extinction of many of the rare indigenous plants. The oleander is mentioned as another formidable enemy.

CHAPTER XIV

ECONOMIC CONDITIONS

By Sir Daniel Morris

Agriculture

Sugar trade.

As agriculture is the main business in the West Indies it is desirable to deal with the subject in some detail. In the eighteenth century the West Indies produced nearly all the sugar, rum, coffee, cotton, and other tropical products imported into the United Kingdom. That was the period of their great prosperity. The decline of West Indian prosperity had begun earlier, but the total abolition of slavery, in August 1838, gave a crushing blow to it. In some of the colonies the cultivation of sugar was still continued, but under considerable difficulty. Then as new fields for the production of cane sugar were opened in other parts of the world, and the production of beet sugar on the continent of Europe, under a system of bounties, was increased in twelve years, 1882 to 1894, from 1,783,200 tons to 3,840,256 tons, the position in the West Indies began to be an anxious one. Another circumstance, the shutting out of West Indian sugar from the American market by a duty of 90 per cent. *ad valorem*, added to the gravity of the situation. In 1895, when matters had become acute, representations were made to the Imperial Government, pointing out that it was impossible for the colonies to provide without external aid for their government and administration, and that the depression under which they suffered was mainly caused by the competition of beet sugar produced under a system of bounties adopted in European countries, which bounties had, at that time, been greatly increased. On the recommendation of Mr. Chamberlain, then Secretary of State for the Colonies, a Royal Commission was appointed in December 1896 to obtain full information as to the facts and causes of the depression, and the general condition and prospects of the colonies.

Royal Commission of 1896.

In their report, which appeared in the autumn of 1897, the commissioners stated that in most of the West Indies the products of the sugar-cane constituted by far the larger proportion of the total exports of native produce, and that in the event of a failure of the sugar industry the welfare of each colony would then depend on the extent to which it might be possible to establish other industries.

The commissioners recorded as their opinion that the depression in the sugar industry was due 'to the competition of other sugar-producing countries, and in special degree to the competition of beet sugar produced under a system of bounties'. They submitted that 'the best immediate remedy . . . would be the abandonment of the bounty system'. In the meanwhile they recommended certain special remedies, such as improved steam communication with outside markets and between the different islands, and the organization of a scientific department to assist the sugar industry and encourage, where conditions were favourable, minor agricultural industries, together with a general improvement in the system of cultivation of the principal crops.

Imperial Department of Agriculture.

Most of the recommendations were sooner or later adopted by the home government, including the creation of an Imperial Department of Agriculture for the West Indies. For the latter, on the motion of Mr. Chamberlain, funds were voted by Parliament on August 2, 1898. The average amount expended from 1898 to 1908 was at the rate of £14,700 per annum. The duties entrusted to the department were the general improvement of the sugar industry and the encouragement of a system of subsidiary industries in localities where sugar could not be grown, or where the conditions were more favourable for the production of cacao, coffee, bananas, oranges, limes, cotton, rubber, coco-nuts, sisal hemp, rice, nutmegs, pine-apples, and other crops. In addition, it was proposed it should devote attention to the improvement of the breed and condition of cattle, horses, and small stock, and to the extension of bee-keeping for the production of honey and bees-wax.

The sugar experiments carried on with the assistance of the department have proved of great service to the planting community in the West Indies. It is estimated that fully one-half of the canes now cultivated in the West Indies are new canes yielding over large areas mean results ranging from 5 to 10 and up to 25 per cent. higher than the older varieties. The grants in aid of sugar experiments from 1898 to 1910 amounted to a total of £58,852. They included £3,852 to British Guiana, £20,000 to Barbados, £14,000 to the Federal Government of the Leeward Islands, £9,000 to the Presidency of Antigua, and £12,000 to the Presidency of St. Kitts-Nevis.

The results of the efforts of the department, ably supported by the officers of the local departments in the colonies concerned, were presented and discussed year by year at the West Indian Agricultural Conferences held at Barbados, Jamaica, and Trinidad. A summary was presented to Parliament in April 1906 (Cd. 2901). A fuller statement covering a period of twelve years, 1898 to 1910, was published in the *West Indian Bulletin* (vol. xi, pp. 231–448).

Other agricultural departments.

One of the indirect results arising from the success of the Imperial Department of Agriculture in the West Indies, the first effort of the kind in the tropics, was the formation of a series of similar agricultural departments elsewhere. The first of these was the Imperial Department of Agriculture in India. This was followed by the formation of the Department of Science and Agriculture in British

Guiana. The other agricultural departments that have been formed since are those in the Federated Malay States, British East Africa, the Gold Coast, Southern Nigeria, Ceylon, Mauritius, Jamaica, Trinidad, Barbados, and Bermuda. Two officers trained in the West Indies are attached to the Imperial Department of Agriculture in India, two are attached to the Agricultural Department in the Federated Malay States, one in British East Africa, one in Mauritius, one in Fiji, and three in the Indian Provincial Departments of Agriculture.

Recent agricultural development.

A striking proof of the recognition of the value of science in assisting agricultural industries is the considerable sums now provided in the West Indies for the maintenance of scientific and agricultural departments. In the four principal colonies, viz. Jamaica, British Guiana, Trinidad, and Barbados, the total expenditure on agricultural services in 1898 amounted to about £14,000. In 1912 the colonial legislatures voted for these services a total of £44,331, or more than three times the amount provided in 1898. Further, the members of the planting community in Trinidad have agreed to submit to a voluntary tax on exports for the purpose of employing additional experts to deal with insects and fungoid pests, for carrying on experimental work and collecting and distributing agricultural information and statistics. The total amount provided by the voluntary tax in 1912 was £3,669. Similar action has also been taken by the planting community in British Guiana. It is probable that the total expenditure on agricultural services in all the West Indian colonies is now not less than £60,000 per annum. There can be no doubt, therefore, as to the considerable awakening that has taken place in the West Indies in recent years, with the result that there has been general improvement financially. Lord Crewe was in a position in 1909 to announce that 'no West Indian colony was then in receipt of grants-in-aid'; in fact, they all had comparatively large sums (£10,000 to £50,000) in reserve to meet emergencies without appealing for outside help. It is only right to mention that there were a number of circumstances that combined to bring about this new era of prosperity in the West Indies. In the first place, the action taken by the Imperial Government to obtain the abolition of the continental bounties brought a revival of confidence in the sugar industry, with the result that capital was available for the improvement of machinery and the establishment of new central factories. A further improvement was brought about by the increased production of cacao in Trinidad, Grenada, and the other colonies; and by the enormous development of the trade in bananas between Jamaica and the United States. The introduction of Sea Island cotton into St. Vincent, Barbados, and the Leeward Islands, in 1903, increased the value of the exports from these colonies to the extent of nearly £200,000 per annum, and the extended cultivation of rice in British Guiana and limes in Dominica added to the general prosperity.

In 1909 a Royal Commission (more fully dealt with in a later page) was appointed to inquire into the commercial relations then existing between the Dominion of Canada and the West Indies, and the steps that might be taken in order to secure and develop mutual trading facilities. As a result of the work of this commission, Canada and the West Indies have now concluded a treaty of mutual advantage which will afford a favourable market for West Indian sugar and other commodities in Canada. This agreement is regarded as likely to add to the stability of conditions in the West Indies and promote their general welfare.

Sugar industry Jamaica.

Sugar was formerly the chief source of wealth in Jamaica. In recent years, owing to the bounties on beet sugar and the competition of other and more remunerative industries, sugar in Jamaica occupies a secondary position. The average value of the sugar and rum exported during the five years 1907–11 amounted to £326,117, or 13·5 per cent. of the total exports. In 1881 sugar and rum represented 46·3 per cent. of the exports.

The sugar plantations in Jamaica number seventy. They are mostly small, varying from 200 to 500 acres. A few estates contain from 600 to 1,000 acres each. The total area under canes in 1912 was 34,766 acres. The manufacture of Jamaica rum receives a large share of attention. The average annual export is 1,300,000 gallons. Nearly all the rum is exported to the United Kingdom. The sugar finds a favourable market in Canada. The Governor, in his Annual Report for 1911–12, states that 'progress continues in the sugar industry and much improvement in manufacture has now been secured by the introduction of modern machinery. The centralization of contiguous estates is proving a successful means of increasing the output of sugar'. Three new central sugar factories have lately been established in the district of Vere, and two similar central factories are at work in the north-west of the island. Improvement in the yield of canes is also in progress. Two new seedling canes from Barbados (B. 208 and B. 147) have been introduced; also a new seedling cane (D. 625) from British Guiana. These and others are spoken of as of undoubted merit and deserving of the general attention of planters.

British Guiana.

The sugar industry is the most important in British Guiana. It contributes 75 per cent. of the total value of the exports and about 33 per cent. of the wage-earning portion of the population are indirectly associated with it. The sugar estates are all situated on the coast and for a short distance along the banks of the larger rivers. The exports in 1911–12 were 99,378 tons of sugar, 3,022,831 gallons of rum, 146,740 gallons of molasses, and 5,102 tons of molascuit. The last is a cattle food prepared from molasses and the finely crushed fibre of the sugar-cane. The total area under cultivation in sugar-canes is about 69,000 acres. A considerable area of the front lands abandoned in sugar is being planted with rice and coconuts. The sugar industry in British Guiana is largely dependent upon the introduction of coolies from India. The average importation during the ten years ending 1901 was 4,120 per annum, and for 1901–11 the average has been 2,435. The chief class of sugar produced is known as 'grey' or 'dark' crystals. In addition, the well-known yellow 'Demarara crystals' are prepared for the English market. In recent years, owing to the preference given to West Indian sugar by Canada, more than two-thirds of the exports now go to that country. British Guiana is the largest exporter of rum in the West Indies. The bulk is shipped to the United Kingdom. Careful scientific experiments have been carried on since 1882 with the view of improving the sugar industry. The experiments with new seedling varieties under the capable direction of Professor Harrison have for their object the production of new sorts of canes immune to disease, and yielding a larger percentage of sugar. The acreage under seedling and other varieties, other than Bourbon (formerly the standard cane of the colony), in 1911 was 46,301 acres, or 67·4 of the total area under cultivation. Experiments with manures for sugar-cane have also been carried on on a large scale.

Trinidad. The value of exports of sugar, rum, and molasses from Trinidad in 1910–11 amounted to £723,949. The value in 1911–12, owing to drought and disease, fell to £530,404. The average value during the five years 1908–11 inclusive was £560,532. A serious pest to sugar-cane, known as the frog-hopper, has appeared during recent years, and, in spite of efforts to deal with it, it occasionally causes considerable loss in certain districts. In an official publication issued by the Board of Agriculture it is estimated that the aggregate loss due to the attacks of the frog-hopper amounts to over £50,000 per annum. An appreciable quantity of canes is grown by peasant farmers, and sold to the central factories. In 1910 there were 12,263 cane farmers (of whom 6,443 were East Indians) and they raised 176,447 tons of canes. On this account the sugar cultivation and manufacture of sugar is regarded as an important factor in the welfare of the chief sugar districts of the colony. The output of the largest central sugar factory in 1910 was 16,116 tons of sugar.

Barbados. The sugar industry is also the mainstay of Barbados. The cultivation of the sugar-cane was begun in Barbados about the middle of the seventeenth century, and has been continued uninterruptedly to the present day. The average exports consist of 38,000 tons of sugar and 35,000 puncheons of molasses and syrup. About 90 per cent. of the sugar is the brown quality known as 'muscovado'. Some of the larger estates also prepare vacuum pan crystals. The exports of sugar and molasses from Barbados during the year 1910 were as follows: Muscovado sugar, 35,906 tons, of the value of £350,084; dry sugar, 3,993 tons, of the value of £45,920; and 77,722 puncheons (100 gallons each) of molasses, of the value of £310,888, making a total value of sugar and molasses of £706,892. Of this amount sugar, syrup, and molasses of the value of £483,711 were shipped to Canada.

Leeward Islands.

Sugar is the largest and most important agricultural industry of the Leeward Islands, and constitutes the principal source of revenue in Antigua and St. Kitts-Nevis. The annual production is about 25,000 tons of sugar and a considerable quantity of molasses and syrup. An important advance in the history of the sugar industry in the Leeward Islands is the introduction of the central factory system, whereby the old-fashioned and wasteful muscovado process has been superseded by modern and economical methods of manufacture. Two central factories were started in Antigua in 1904, and seven years' experience has fully proved the value of the system. The Gunthorpe factory has been enlarged to a yearly capacity of 8,000 tons of sugar. Peasant farmers' canes are also purchased at these factories. In 1911 a central factory was erected at St. Kitts with a maximum output of 10,000 tons of sugar. When working to their full capacity the central factories at Antigua and St. Kitts will be able to deal with more than one-half the total sugar output of the islands. This will result in a larger amount of sugar being produced than formerly, and the quality will be improved so as to obtain higher prices. Considerable progress has also been made during recent years in the introduction of new and improved canes to replace the Bourbon cane formerly cultivated in the Leeward Islands. White transparent and the best of the new seedling canes are now widely cultivated in Antigua and St. Kitts.

Caca

The principal crops of cacao are produced in Trinidad, Grenada, Jamaica, St. Lucia, and Dominica. Its importance may be estimated from the fact that cacao is the principal crop of Grenada, and the value of exports from Trinidad is more than double that of sugar. The cultivation is steadily extending, but, as Dr. Watts remarks, it is doubtful whether the output is increasing as fast as might be expected from the extent to which new plantations are carried on. This, he says, is a subject that deserves careful attention. The total annual production of West Indian cacao is about 670,000 cwt., of the value of £1,800,000. Trinidad and Grenada between them produce about 85 per cent. of the total exports.

The demand for raw cacao is largely extending in the United States, France, and Germany. Great Britain stands fourth on the list of consumers of cacao. The crops of cacao are easily affected by the character of the season at the time of flowering; also by conditions of soil, cultivation, manuring, and the presence of blight and pests. Much interest has been taken in recent years in the selection and cultivation of improved varieties of cacao, and their suitability for particular districts, and the requirements of the chief markets; also there is useful experimental work being carried on in introducing the system of grafting the most productive sorts of cacao, instead of raising them from seed. Dominica is leading the way in this direction.[1]

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[1] The exports of cacao during the five years 1906-7 to 1910-11 wer as follows:

	1906-7. *cwt.*	1907-8. *cwt.*	1908-9. *cwt.*	1909-10. *cwt.*	1910-11. *cwt.*
Trinidad . .	246,169	444,023	438,724	466,492	516,595
Jamaica . .	47,564	47,469	49,142	57,454	41,444
Grenada . .	73,743	102,483	101,370	108,128	118,667
St. Lucia . .	14,100	15,353	12,098	19,554	14,610
Dominica . .	11,208	11,463	9,537	10,680	10,055

The values of these quantities are shown in the following table:

	1906-7. £.	1907-8. £.	1908-9. £.	1909-10. £.	1910-11 £.
Trinidad . .	802,070	1,786,386	1,152,285	1,131,425	1,230,097
Jamaica . .	109,992	151,903	90,914	110,049	101,448
Grenada . .	166,538	361,128	311,519	248,398	259,365
St. Lucia . .	41,538	47,292	30,487	40,937	4[illegible],935
Dominica . .	34,653	35,440	29,486	23,051	21,645

Fruit. The West Indies produce in abundance all the choicest fruits of the tropics. Pine-apples, mangoes, oranges, grape fruit, melons, passion fruit, papaw, and cherimoya are plentiful in Jamaica, and almost to the same extent in Dominica. In some of the other colonies they are somewhat less abundant. In British Guiana some fruits, such as mangoes, passion fruit, and pine-apples, are of exceptional quality. Bananas, oranges, limes, and grape fruit form the bulk of the fruit exported to northern latitudes. By far the largest tropical fruit industry in the world has been developed in recent years at Jamaica. Fruit, principally bananas and oranges, now forms 58·3 per cent. of the total exports of the colony. The value in 1912 was £1,624,245.

The principal market for bananas is in the United States of America. The exports in 1912 were 16,497,385 bunches to the United States and 150,678 to Great Britain. Oranges were shipped to the value in 1910 of £54,902. Grape fruit was exported in the same year to the value of £23,300. The fruit exports generally are subject to considerable fluctuations from year to year, depending on the season and the demand. Some small shipments of bananas are made from Trinidad and Barbados. Bananas and plantains of the value of £23,319 were shipped in 1911 from British Honduras, and grape fruit, oranges, and fresh and preserved pine-apples were exported from the Bahamas to the value of £9,176.

Limes One of the most promising of the newer industries is the cultivation of the West Indian lime. This, it may be mentioned, is a variety of the lemon, but the fruit is smaller, with a much thinner rind, and it is claimed that the juice is richer in acid contents. The trees are of the size of an average apple-tree and the branches are ordinarily furnished with prickles or spines. There is a spineless variety, and also one that produces fruit without seeds. In Dominica it has been stated that the fruit borne by spineless trees yield on an average acidity of 14·4 oz. of citric acid per gallon of juice as compared with 13·3 oz. per gallon obtained from the ordinary variety. Apparently this is not constant under all circumstances, and the matter requires further investigation.

Lime products form the principal exports of Dominica, and largely also of the island of Montserrat. A large tract of land is in course of being established in limes at British Guiana. Of this 650 acres have lately been planted. Limes are also being grown at St. Lucia, Carriacou, and Antigua. Fresh limes are exported from Dominica to the annual value of £10,000. Limes can be used for every purpose to which the lemon is applied, and they are esteemed as being more economical, and superior to that fruit. Raw lime-juice is exported for making cordials, while concentrated lime-juice forms an important source of commercial citric acid. The standard at which concentrated lime-juice is sold is a pipe of 108 gallons testing 64 oz. of acid to the gallon. The equivalent of this in the West Indies is a 52-gallon hogshead testing 133 oz. to the gallon. The manufacture of citrate of lime is also being carried on in the West Indies. In regard to the prospects of this new development an authority on the subject states, 'Citrate of lime is preferred to concentrated juice by acid makers. . . . A higher price is paid for lime citrate than for juice, and there is a considerable saving in freight, casks, and loss by leakage. . . . We believe that more citric acid can be saved in making citrate than in making concentrated juice. The demand for citric acid averages about 6,000 tons of citrate per year, of the value of over half a million sterling.'

Other products of the lime industry are pickled limes, hand-pressed essential oil of limes, and distilled lime oil. The total value of the lime products shipped from Dominica in 1911 was £70,790, including £19,260 the value of citrate of lime. The value of shipments of similar products from Montserrat in 1911–12 was £41,665.

Coco-nuts.

In view of the recent appreciation in prices of coco-nut products, it is anticipated that increased attention will be devoted to the industry in suitable localities in the West Indies. It is not improbable that the cultivation may prove very remunerative, as there are large markets available, both in the United States and in Great Britain. Coco-nut production has already assumed considerable proportions. The total exports of nuts in 1912 reached a value of £220,647. In addition, coco-nuts are largely utilized locally for a variety of purposes. In British Guiana and Trinidad, where there is a considerable consumption of coco-nut oil among the East Indian coolies, the locally produced article has gradually displaced the imported coco-nut oil. Other coco-nut products are copra (dried kernel) and coco-nut meal for feeding cattle.

There are extensive areas of coastal lands admirably adapted for coco-nut growing in British Guiana, Trinidad, and British Honduras outside the hurricane regions. In British Guiana 12,236 acres are under cultivation. During 1911–12 the exports were over one and a half million nuts. The exports of nuts from Trinidad in 1909 amounted to 20,000,000 nuts, of the value of £72,557. Even in Jamaica, where a hurricane occasionally occurs, coco-nut cultivation has assumed as large proportions as in any of the other colonies, if not larger. The exports in 1911 were 20,457,000, of the value of £98,687. In the Report of the Agricultural Department for 1912–13 the director states ‘the progressive recovery of the exports of coco-nuts from the disastrous set-back caused by the hurricane of 1903 has been maintained, and an export of 23,000,000 nuts since the disaster of nine years ago’. About 400 acres have recently been planted in coco-nuts in Antigua and Nevis. Sir William Lever is credited with the opinion ‘that there is no field of tropical agriculture so promising at the present moment as coco-nut planting’.

Cotton. At one time the West Indies produced practically all the cotton used in the United Kingdom; but as sugar was found more profitable the cultivation of cotton was abandoned. A small peasant industry still survived in the island of Carriacou; but elsewhere attention was devoted to other crops. In order to broaden the basis of prosperity and compensate for the falling off in sugar, the Imperial Department of Agriculture in 1903 obtained seed of the best Sea Island cotton from South Carolina of the value of £500, and distributed it among the planters in the West Indies. In addition, a staff of instructors was employed to give assistance and advice to the growers, and a number of ginning factories was established to deal with the crop. Thus was laid the foundation of an important new industry. The crop produced in 1904 was of the value of £32,000; in 1905 it had increased to £63,000. The total exports of West Indian cotton during the period from 1904 to 1912 have reached a total value of over a million sterling. Valuable services in this connexion were rendered by the British Cotton Growing Association and Sir Alfred Jones, in making grants of money and machinery, also in taking charge of the shipments of cotton at Liverpool and obtaining the best market for them. The Association also arranged for the expert assistance of Mr. E. Lomas Oliver, who visited the West Indies in order to advise the planters as to the requirements of the Lancashire spinners and provided for the services of a travelling inspector to carry on investigations in connexion with the industry. It is admitted that if Sea Island cotton had not been obtained in appreciable quantity in recent years from the West Indies, several of the fine-spinning cotton mills in Lancashire would have been compelled to work short time. It is interesting to learn that the island of St. Vincent produces the highest class of cotton grown in any portion of the British Empire. The price in some years has reached two shillings and eightpence per pound. Sea Island cotton is remarkable for its strength and fineness. The best qualities are used for making Brussels lace, chiffon, and other delicate articles. The coarser sorts are utilized for the sails of yachts, tyres of motors, and American mail-bags.[1]

Rice.

Rice is an important article of food in most of the colonies, especially in British Guiana and Trinidad, where East Indian coolies form an appreciable portion of the population. A remarkable development in rice-growing has taken place in recent years in British Guiana. The industry is almost entirely in the hands of East Indians. The long-grained varieties are most in favour. There are acclimatized varieties of rice known as 'Creole' and 'Berbice Creole' which have proved both hardy and productive. The rapid extension of the industry is largely due to this fact. In addition, over two hundred of the best varieties from other rice-growing countries have been introduced and submitted to careful trials as against the Creole sorts. New varieties have been raised by the Department of Agriculture by cross-breeding and selection. Some of the latter are most promising, indicating increase in yield of over thirty per cent. as compared with the standard varieties. Rice of two qualities are turned out at the central mills in Georgetown: (1) a brown rice prepared by steeping the paddy before it is milled, and (2) a pure white rice. The brown rice is regarded as the more nutritious. Rice meal is shipped and a cattle food called 'calco' made from the fine rice husks and rice 'ends' soaked in molasses. The total area under rice cultivation in British Guiana is 38,000

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[1] Sea Island cotton exported from the West Indies, October 1, 1910, to September 30, 1911:

Colony.	*Weight.* *lb.*	*Estimated value.* £.
Barbados	726,573	42,346
St. Vincent	558,786	44,237
Montserrat	404,733	30,362
Nevis	344,395	24,603
St. Kitts	329,322	24,067
Anguilla	148,595	10,207
Antigua	96,992	6,795
Virgin Islands	50,337	3,180
Trinidad and Tobago	6,056	456
Grenada and Carriacou	274,224	10,205
	2,940,013	£196,458

acres. The progress of the industry may be realized from the fact that while in 1895 the importations of rice from India amounted to 34,000,000 pounds, of the value of £142,000, they have been gradually reduced until in 1912 they were only a little over 500,000 pounds, of the value of £2,807. In addition to meeting local requirements, over 12,000,000 pounds of rice were exported in 1910 to the neighbouring colonies, of the value of £68,000.

The cultivation of rice is also extending in Trinidad, where 11,000 acres are under this crop. Jamaica is another colony possessed of land suited for rice-growing. The important factors leading to a successful rice industry in the West Indies are (1) the existence of large areas of low lands furnished with a reliable water-supply, and (2) the presence of an appreciable population of East Indians possessed of a practical knowledge of rice-growing. Under such circumstances the industry is capable of very considerable extension, and it is not unlikely in the near future to become of great commercial importance. As showing the very considerable demand for rice still existing in the West Indies the following particulars are quoted for the year 1911–12: Jamaica imported 13,000,000 pounds, of the value of £65,037; Barbados, 16,000,000 pounds, of the value of £95,621; and Trinidad, 27,000,000 pounds, of the value of £136,989. The total quantity of rice imported into the three colonies in the year 1911–12 amounted to 56,000,000 pounds, of the value of £297,647.

Rubber and balata.

With the exception of the larger colonies rubber cultivation is not likely to develop into an important industry in the West Indies. There are, however, good prospects for rubber cultivation in British Honduras, British Guiana, Trinidad, and probably also in Jamaica. A large area of Cohune ridge, in British Honduras, is admirably adapted for rubber-growing. In British Guiana, in wide districts bordering on the numerous rivers, rubber trees are likely to thrive under favourable conditions. In the Handbook for 1913 it is stated that ‘ there are 10,880,000 acres of easily accessible lands, of which fully 9,000,000 acres are unalienated from the Crown. Of this vast area a very large proportion is eminently suited for the cultivation of Para rubber.' In 1911–12 there were 2,252 acres planted with rubber trees. Since 1909 the Government have imported large quantities of Para rubber seed, and obtained a germination of over eighty per cent. Tapping of Para rubber has commenced on two estates on the Demerara River. At the Issorora Experiment Station 'over one-fourth of the total number of Para rubber trees at four years old were of sufficient size for tapping and the yields were satisfactory'.

British Guiana has exported rubber of the value of £7,000 and Tobago has begun to make commercial shipments of the value of £1,388. There is a distinct tendency in late years to confine the cultivation to Para rubber, and to pay less attention than formerly to the Castilloa or central American rubber. It is not improbable that when rubber prices fall the greater cost of labour in the West Indies as compared with Malay and Ceylon may become the controlling factor as to the ultimate development of rubber-growing in the West Indies.

A native gutta-percha known as balata is the third most important industry in British Guiana. It is a forest product prepared from the latex of *Mimusops globosa*, a tree found widely dispersed over the lower lands along the banks of the smaller rivers and creeks, especially in the Canje district of Berbice. When first tapped each tree yields an average of one gallon of latex, equal to five pounds of dry balata. The industry is regulated by a system of licences, and no tree is allowed to be tapped which does not measure thirty-six inches in girth at four feet from the ground. The exports of balata have steadily increased from British Guiana in recent years as shown in the following table :

Period.	*Total for Five Years.*	*Average Export per year.*	*Average Value per year.*
	lb.	*lb.*	*£.*
1893–1897	1,133,123	226,625	12,105
1898–1902	2,009,783	401,956	21,955
1903–1907	2,488,951	497,790	46,186
1908–1912	5,376,079	1075,216	110,465

The tree yielding balata is also found in Trinidad, but apparently it is not largely tapped in that island. In the trade returns of Trinidad for the year 1911 balata in transit, probably from Venezuela, is shown among the exports to the value of £476,861.

Arrow-root and starch.

The island of St. Vincent is one of the chief sources of the supply of arrowroot, and for a long time after the decline of sugar it was the principal source of revenue. In recent years cotton has taken a leading place. Although Bermuda arrowroot is regarded as the best, it is produced in such small quantity (about 174 cwt. per annum) that it is negligible from a commercial point of view. The annual exports of arrowroot from St. Vincent are 5,000,000 pounds, of the value of £30,000. A good price is at the rate of 2½*d.* to 3*d.* per pound. It is claimed 'that St. Vincent arrowroot is unrivalled, not only as an article of diet for invalids and children, but also in the manufacture of chocolate and for general starch purposes'. The volcanic soil and the equable rainfall of St. Vincent are exceptionally favourable to the successful cultivation of arrowroot (Plate XXXII).

Experiments are being carried on at Jamaica and Dominica with the view of producing cassava starch and crude cassava meal on a commercial scale. The cassava root in Jamaica is stated to contain 33 per cent. of starch, as compared with 16 per cent. in the potato. An average return of ten tons of roots per acre is regarded as obtainable under good cultivation. In Dominica eight tons per acre is regarded as a fair average. It is anticipated that a favourable market will be found in Canada for cassava meal and starch.

Tobacco.

Tobacco is only produced on a commercial scale in Jamaica. The area under tobacco is about 804 acres, and the exports of tobacco (including leaf tobacco, cigars, and cigarettes) in 1911 amounted in value to £40,005. The cultivation of tobacco is carried on for the most part by Cuban settlers, who occupy small holdings of a few acres each, and devote their whole time and attention to the care of the plants and the subsequent preparation and curing of the crop. There are several cigar factories in Kingston. The high character of the best Jamaica cigars is well recognized in this country.

Other products. In addition to the above, the West Indies produce other agricultural commodities of hardly less importance. Mention might be made of coffee of the yearly value of £167,409, honey and beeswax of the value of £23,505, pimento, or allspice, of the value of £73,660, logwood and logwood extract of the value of £229,818, and fustic and bitter-wood of the value of £15,682 exported from Jamaica. Chicle gum (for chewing purposes in the United States) of the value of £198,678 is exported from British Honduras. Lily bulbs, spring onions, and other vegetables are exported from Bermuda to the United States of the annual value of £86,608. Grenada, the spice island of the West Indies, exports nutmegs, mace, and cloves of the yearly value of £20,000. The Bahamas export, besides sponges of the value of £111,381, sisal hemp of the value of £44,855, native lumber of the value of £31,496, fruit and vegetables of the value of £9,176, and conch shells and turtle of the value of £6,405. Crops of yams, tanias, maize or Indian corn, ground-nuts, beans, various peas, sweet potatoes, cassava, arrowroot, and bread-fruit, are grown on a large scale in all the colonies, but with the exception of yams and sweet potatoes, exported to the Panama Canal zone, they are chiefly used for local consumption.

Pastoral industries. The number of domesticated stock existing in the West Indies, considering the area, is not large. This is accounted for by the fact that the best lands are occupied by such extensive agricultural crops as sugar, cacao, and fruit. Nevertheless, in the aggregate, the horses, cattle, and small stock are of considerable value. Jamaica is noted for its pen-keeping (for rearing horses, mules, and cattle) and its dairying. There are about 300 grazing pens, with over 100 head of cattle each. The total number of horned stock in the pens in 1912 was 117,646. Some of the larger grazing pens contain from 1,040 to 3,380 head of cattle. The number of horse-kind in the island in 1912 was 56,917 ; sheep, 12,373 ; pigs, 31,116 ; asses, 21,740. The exports of cattle and horses in 1911 were of the value of £6,346. The area returned under the useful and nutritious Guinea grass (*Panicum jumentorum*) is 143,592 acres. Good horses, especially polo ponies, are bred in Jamaica. The government and the local agricultural society encourage the introduction of sires for the improved breeding of stock, and a school-farm with 250 head of stock has been established at Hope, near Kingston. The Director of Agriculture reported that in March 1912 there were 43 pedigree red-polls, 19 pedigree Jerseys, and 15 Canadian dairy cows and heifers in good health and condition at the farm. Of these 82 dairy-bred heifers by pedigree Jersey, Guernsey, shorthorn, and red-poll bulls had been reared during the past three years ; 122 foals had been produced from the imported thoroughbred stallion 'Water Jacket', and 41 pedigree boars and 36 shoals of the British large black breed of pigs had been distributed through the island.

Cattle

Many breeds of Indian cattle have been introduced from time to time to Jamaica, and are much valued on account of their hardiness and suitability to the climate for draught purposes. It is stated 'that Indian cattle surpass all others and are best suited for all classes of work'. Several English breeds have been found suitable. Hereford cattle have done well and are splendid beef animals ; shorthorns, where the feeding is good, are valuable for beef and milk ; in some districts Devons are considered the most hardy of English breeds for general working purposes.

In spite of the existence of extensive savannas, some of which might be utilized for cattle-raising, Trinidad is largely dependent for its animal food (with the exception of small stock and poultry) on shipments from Venezuela. The horned cattle imported in 1911 were 8,253, of the value of £48,064. A government farm has been maintained for many years for the improvement of Indian and other working cattle, and dairying. In addition to supplying local requirements, the neighbouring colonies have also benefited by being able to obtain pedigree cattle, and small stock from the Trinidad farm.

In British Guiana, in addition to practically meeting home requirements, cattle are exported to Dutch Guiana. Cattle are also raised on the extensive savanna tracts in the far interior. These are exported to Brazil, as suitable transport facilities are not available for bringing them down to Georgetown and the coast districts. In recent years the Department of Science and Agriculture and the Board of Agriculture have devoted attention to the introduction of improved breeds of cattle and horses and small stock. The Board of Agriculture returns publish the following summary of domestic animals in the colony: cattle 81,500, sheep 19,500, goats 11,170; horses 2,650, donkeys 5,370, swine 17,000. A government stock-farm is maintained in connexion with the Onderneeming school.

In the smaller islands the Imperial Department of Agriculture, from 1900 to 1909, maintained stud-farms in connexion with the agricultural schools at St. Vincent, St. Lucia, Dominica, and Antigua, and encouraged the keeping of brood-mares, milking cows, and small stock amongst the peasantry. It also introduced numerous selected animals for breeding purposes, and employed a bee expert to advise as to the successful production of honey and wax.

Settlement

The Toledo Settlement, British Honduras.

Many attempts have been made in the West Indies to establish colonies of Europeans as settlers to engage in agricultural pursuits. In British Honduras, after the civil war in the Southern States, a number of families settled on lands about a mile north of the Carib village of Punta Corda in the southern portion of the colony. This was known as the Toledo Settlement. One hundred arrived in the first steamer in 1868, and 200 more in the following year. They built houses, constructed four miles of road and a wharf, dug wells, and resolutely set to work to clear the land and plant it. The result of the experiment was watched with great interest. Although it is generally considered that the white man is not suited for laborious work in the tropics, and that it is more conducive to his interests to possess capital and secure the services of the negro or coolie for field work, yet it was possible in this instance for the white settlers at Toledo with little or no capital to turn a wild tropical forest into a number of thriving homesteads. Most of the settlers grew sugar-canes and made muscovado sugar of superior quality, which was sold locally at prices ranging from 5½ cents to 6 cents per pound. In addition to cultivating sugar some of the settlers raised cattle, a rich pasture being formed naturally after the forest was cut down and cleared. After passing through various vicissitudes, the settlement in 1882 was reduced to fourteen families. Little was heard of it in later years. Probably by this time all the original settlers have either died or returned to the States. The experiment, though it started well, was doomed to failure. Several attempts were made to colonize with whites—German and others—in Jamaica. According to Cundall, 'the communities have almost always either dispersed or been immersed in the native race. The failure is not to be put down to the heat entirely. . . . It is in a great measure due to uncongenial surroundings, which too often lead to drink and other evils.'

White labourers in Barbados.

It is mentioned in the early records of Barbados that 'white servants (as labourers) were the mainstay of the colony until the development of the sugar industry fostered the importation of negro slavery'. White servants in those days were for the most part persons who came out under an indenture of service or were prisoners of civil war, shipped to be sold in the colony. A small remnant still survives at Barbados. Governor Rawson, reporting on the decrease of the white population in Barbados, says, 'the reduction in 1871 may be attributed chiefly to the decrease in that class of whites, who in the time of slavery were attached as militia tenants to the estates, and who after the emancipation found some employment on them, while others emigrated or became small shopkeepers or freighters; but the larger portion who failed to find such employment on the estates have sunk in the social scale—living in poverty and squalor—and are known by the name of "poor whites", or in the Scotland district as "red legs".'

Having briefly referred to attempts to establish settlements of white people on lands in the West Indies, it is desirable to mention the results in recent years to encourage peasant settlements among the black and coloured people.

Peasant settlements: Jamaica.

In Jamaica there exists a larger body of negro landholders than possibly in any other portion of the West Indies. The number is variously estimated at from 90,000 to 100,000. In the official returns 'holdings of and under £40 each in value number 124,642 and contribute £12,200 to the property tax'. In the majority of cases, owing to the excellent system of employing travelling agricultural instructors and training the teachers in the elements of practical agriculture, the peasant holdings in Jamaica are well cultivated and yield good results.

St. Vincent.

In some of the Lesser Antilles where, owing to the decline of the sugar industry, the labouring population had lost their principal means of support, the Royal Commission of 1897 recommended that steps be taken to acquire some of the unused sugar estates and establish a peasant proprietary scheme. Owing to the special condition existing in the island of St. Vincent a grant of £15,000 was made by the Imperial Government in 1899 for the purchase of certain areas for allotment in small holdings of about five, but not exceeding ten, acres each. In selecting applicants for allotments priority was given to those prepared to pay 25 per cent. of the value of the lot; the remainder of the money was to be paid—after an interval of five years—in twelve annual instalments, together with interest on the balance at 3 per cent. per annum. Other applicants, if considered eligible, were to pay at the end of the first year one-sixteenth part of the purchase money and the remainder in annual instalments with interest at 3 per cent. on the money outstanding at the end of each year. Every purchaser was required to reside on his allotment and carry on his cultivation under the guidance of the officers of the

Imperial Department of Agriculture. In the event of failure to comply with the conditions laid down the allottee would forfeit his claim to the land and house, if any, and to all crops and instalments paid.

The total area purchased and settled amounted to 5,060 acres at a cost of £11,277. The number of rural lots sold was 581, and the number of township lots 416. In a statement of receipts and expenditure to December 31, 1910, the receipts (including the government grant of £15,000) amounted to £30,025 and the expenditure to £27,561.

Numerous roads were constructed leading to the settlements, and bridges were constructed, where necessary, to afford facilities for bringing the produce to market. Considerable areas were planted in cassava, maize, or Indian corn, pigeon peas, ground-nuts, and other food crops. For the surplus produce the cultivators have found a ready market in Trinidad and Grenada ; while in Trinidad and Barbados they have been able to dispose of small stock, poultry, and cattle. After the introduction of Sea Island cotton in 1904, about 290 acres have been planted on the holdings. 'Largely owing to the advice given by the agricultural instructors, the yield of cotton per acre each year has been satisfactory. It is estimated that the value of the season's crop in 1910 exceeded £3,000, giving a gross value of over £10 per acre.'

Summary of results of settlement in St. Vincent.

In a report on the administration of the Road and Land Settlement Fund at St. Vincent, presented to Parliament, July 1911 (Cd 5,742), the following summary of the results of this interesting experiment is given: 'That the material welfare of the colony, as a whole, has improved since the year 1897 is a fact about which there is no room for doubt, and there is every indication that the march of progress will continue. How much of this increased prosperity is due to the land settlement scheme is a question to which it would be impossible to give a definite answer. But this much at least can be asserted with confidence, the condition of the native population has emerged from that extremely critical state which the Royal Commissioners found to exist when they visited the island in 1897.

Since the decay of the sugar industry, private enterprise has, it is true, established other industries on a sufficiently large scale to afford employment to a great number of the native population. At the same time, the existence of a class of peasant proprietors must necessarily have a beneficial effect both on those who have taken advantage of the scheme, and also on the general welfare of the island. Land which formerly was ill cultivated, or not cultivated at all, is now yielding a rich return, and certain estates round the coast, which before lay almost fallow in the hands of private owners, have been bought by the State and re-sold to an agricultural class. It would be impossible to compare the condition of St. Vincent to-day with that of twelve years ago without a sincere feeling of gratitude for the much-needed assistance which the parliamentary grant has given, not only to those whose condition it was primarily meant to benefit, but also to the progress and prosperity of the colony as a whole.'

Carriacou. Encouraged by the results achieved at St. Vincent, a somewhat similar scheme has been adopted in the small island of Carriacou, a dependency of Grenada. In the report in the Blue Book for 1911 the results are given as follows: 'The Carriacou Land Settlement Scheme continues in a flourishing condition, and it is not too much to say that by its operation this interesting and valuable dependency has in less than nine years been brought from desolation to comparative affluence. The total area so far dealt with is 1,510 acres, of which 1,089 acres have been allotted in 393 lots, leaving reserves (chiefly forest) of 421 acres. The total amount advanced from colonial revenue has been £8,450, of which only £950 was outstanding at March 31, 1912. An earnest demand is now being made by other peasants there, willing and anxious to become landowners under similar auspices, and the extension of the scheme is receiving the careful consideration of the Government.'

Grenada. Two small peasant settlements are in course of being established at Grenada, and a third, containing 300 acres, was started in January 1912.

Manufactures and Economic Products

Manufactures connected with sugar industry.

The principal manufactures in the West Indies are those associated with the sugar industry and such by-products as rum and molasses. In the larger colonies the sugar factories are well equipped, and are being steadily improved and enlarged. Centralization has been carried out with the view of economy and securing the best market for the produce. For instance, in British Guiana in 1882 there were 106 sugar factories ; in 1912 they had been reduced to 39 without any diminution in the out-put. Similar steps are being taken elsewhere. In Jamaica the governor reports ‘ much improvement in the manufacture of sugar has been secured by the introduction of modern machinery ; while the centralization of contiguous estates is proving a successful means of increasing the out-put of sugar ’. Two central sugar factories are in successful operation at Antigua, and a large central factory, capable of producing 10,000 tons of sugar, was erected in St. Kitts in 1911. At Barbados, where the conditions are of a special character, there are 332 large and small sugar plantations; of these 107 have steam power, the remainder depend on wind power. Factories for the manufacture of biscuits are established at Jamaica, British Guiana, and Barbados. Iron-work foundries and two boot and shoe factories exist in British Guiana. A government floating dock and a workshop are in successful operation at Trinidad. Chemical manure works and a sulphuric acid factory are established at Barbados. In the Bahamas there are two pineapple canning factories, several sisal factories and a lumber-mill at Whale Cay.

Mining.

The chief mining operations are carried on in connexion with gold and diamonds in British Guiana. The gold industry was started about 1884. From that date the gold production steadily increased until 1893–4, when it reached a maximum output of 138,528 oz. In later years it has somewhat declined. The gold-bearing areas are widely distributed throughout the colony; the districts where mining has been chiefly carried on are those adjoining the Essequibo River and its tributaries, the Mazaruni, the Barima, and the upper Demerara rivers. The most valuable goldfield for its size is at Omai, on the left bank of the Essequibo River, where 95,000 oz. were obtained from an area of about 60 acres. A large proportion of the gold has been obtained from alluvial washings in placers by the 'tom' and 'sluice'. In 1890 several companies were formed to work gold reefs that had been discovered on the Demerara and Barima rivers. Auriferous quartz has been successfully worked for brief periods, but according to the Handbook of 1913, 'all the quartz mines are, at present, closed down.'

The following is the amount of gold recorded at the Department of Lands and Mines in 1884–1912:

	oz.
1884–1905	1,756,630
1905–1906	94,363
1906–1907	85,505
1907–1908	67,209
1908–1909	73,655
1909–1910	64,830
1910–1911	54,989
1911–1912	50,274
Total	2,247,455

The value of the above was £8,193,845.

Fine gold occurs in certain localities, but, as a rule, the gold obtained in the colony is coarse and nuggety. The largest nuggets have been one of 333 oz. from the Five Stars Districts in the Upper Barima River, and one of 111½ oz. from Tiger Creek, Potaro.

Diamond.. Diamond mining was started in British Guiana about 1890 in the Upper Mazaruni River, at Putareng Creek, and is still being carried on in the district. Diamonds have also been found around the Kuribrong and Cuyuni rivers. The stones are obtained by washing the gravel by 'sluicing' as for gold. The following is the production of diamonds in 1907–12:

	Carats.
1907–1908	2,121
1908–1909	5,617
1909–1910	7,180
1910–1911	3,035
1911–1912	7,647

The stones are of good quality and run on an average from ten to fifteen to the carat. Some large stones have been found, including two weighing 12¼ and 12½ carats each.

The administration of the gold and diamond fields is under the Department of Lands and Mines. The royalty on gold is 70 cents (2*s.* 11*d.*) per oz. Diamonds found on prospection pay a royalty of 10 per cent. on their value. All gold, silver, and diamonds must be reported on arrival in Georgetown at the Department of Lands and Mines.

Petroleum oil fields: Trinidad.

As indicated in the section on Geology, the existence of petroleum in the West Indies has been known for a long period, but until quite recently no organized attempts had been made to discover the localities where the oil was capable of being obtained in large quantity under favourable conditions. The West Indian oil-fields occur in Tertiary strata. Those of Trinidad are in the southern portions of the island, and, according to Professor Codman, occur in rocks of a depth of 6,000 to 6,500 feet containing many oil horizons, of which three distinct zones have already been located. For the conservation of petroleum oil three conditions are necessary, namely, 'material from which the oil can be formed by chemical processes, strata of sufficient porosity to retain the oil, and impervious strata to seal up the oil.' All these conditions are present in the strata of Trinidad. Further, in order to concentrate the oil, suitable geological structure of the rocks is essential. Owing to the earth-movements that have taken place in the southern districts of Trinidad, the rocks have been thrown into a series of folds or 'anticlines'. There are three of these anticlines, which run almost parallel to the southern coast and stretch in a northerly direction from San Fernando to the eastern coast. As a manifestation of petroleum, the Pitch Lake of Trinidad is well known. It is a remarkable deposit of asphalt, with an area of 127 acres and an estimated capacity of not less than 10,000,000 tons. About 1,500,000 tons have already been removed for use as paving material in the United States and in Europe. On this the government of Trinidad has received in recent years royalties amounting to £400,000. Besides the natural asphalt, another quality, from which all the water (about 25 per cent.) has been eliminated, known as epuré, is also exported. The asphalt exported from Trinidad in recent years is as follows :

	Quantities. Tons.	*Value.* £.
1897–1902	665,210	741,859
1903–1907	669,877	780,119
1908–1911	766,334	850,342

Manjak.

Another product of petroleum is 'manjak', a solid friable bitumen resembling cannel coal occurring in veins. This has been derived from heavy petroleum traversing fissures in clay, leaving only a solid mass. There are 'manjak' or glance-pitch mines at Barbados. About 174 tons, of the value of £1,306, were exported in 1910. A similar product is exported in small quantities from Trinidad.

Extent of oil-bearing territory.

According to the late government geologist, Mr. E. H. Cunningham-Craig, F.G.S., 'a geological survey of Trinidad has shown that about 600 square miles are in oil-bearing territory, and that much more easily accessible and economically workable oil-fields existed in other parts of the colony.' Writing later, Mr. Cunningham-Craig states: 'There are many different grades of petroleum to be obtained in the island. The youngest oil-sands, known as the La Brea oil-bearing group, yield a heavy asphaltic oil, which has been used largely as fuel, and as a road dressing after the separation of the lighter fractions. It contains an appreciable percentage of sulphur. The Rio Blanco oil-sands yield a more valuable product, with higher percentage of petrol and kerosene, and under certain conditions, as proved by the South Naparima Oil Company, a very valuable oil can be obtained from these beds. The percentage of sulphur is so minute as to be negligible. A much older oil-bearing horizon, the Galeota oil-sands, has also yielded a fairly light asphaltic oil. Between the two latter horizons thinner and less widely distributed oil-rocks are known; it is among these that the paraffin oils are found.'

Several companies have been started, and although, as was anticipated, some have not been successful from want of funds and other circumstances, there can be no doubt that oil has been struck 'in great quantity in seven different and widely separated districts'. Some of the difficulties met have been due to the fact that the wells have 'sanded up' so rapidly it has been impossible to produce the oil steadily or maintain regular production. One company that started operations in 1907 obtained a production of oil at the rate of 600 to 700 barrels per day from comparatively shallow borings. The sanding up of the wells caused a check for some time. At present, after boring into a lower stratum, the production is so satisfactory that it is anticipated the enterprise will prove one of the most successful in Trinidad.

Another company drilled in October 1912, and 'a twelve and one-half inch casing was placed in the bore and cemented at 707 feet to shut off surface water, a ten-inch casing at 1,422 feet, and six-inch casing at 1,606 feet. The top of the oil-sands was found at 1,484 feet, and they were penetrated to a depth of 122 feet, though it was believed that there were other productive layers not yet entered when the flow of oil interrupted operations. A great flow began on November 26 at the rate of 10,000 barrels daily. Between 15,000 and 30,000 barrels were lost owing to lack of local storage, pump, and pipe-line facilities adequate for collecting and transporting so unexpectedly large a yield.' The well continued to flow uninterruptedly to April 1913, when its rate was about 300 barrels per day. One hundred thousand barrels of oil from this well were placed in storage tanks ready for shipment.

The problems that have to be worked out in Trinidad in order to place operations for oil on a paying basis are said to be three in number, namely: (*a*) finding a sufficient supply of oil under conditions making for permanency within reasonable limits; (*b*) the complete equipment of each well against the severe gas pressure hitherto met with; and (c) the selection of a method to establish the flow of oil so that it will not be retarded or stopped by sand. These problems are all in course of being gradually solved. The total production of the company referred to for the year ending January 31, 1913, was 247,208 barrels, or an average of 675 barrels per day.

Position of Trinidad oil industry in 1910–12.

A good deal of pioneering work has been done at Trinidad since 1910; huge storage tanks have been erected, pipe-lines have been laid, and oil has been shipped amounting to several million gallons. Heavier drill-pipes, heavier pumps and hose, and pipes sufficiently strong to oppose the tremendous gas pressure by increased water pressure are in course of being provided for future use.

Mr. Cunningham-Craig states that, in spite of the difficulties hitherto experienced and the large sums of money already expended with only moderate results, he is in a position 'to predict with confidence a successful future for West Indian petroleum'.

Reviewing the position of the oil industry in Trinidad in 1911–12, the Colonial Secretary quotes the Inspector of Mines as stating that, 'taken generally, the progress of the petroleum industry has not been satisfactory during the year. This was due to the under capitalization of several companies operating in the island and to other causes over which the Government had no control.' It is not improbable that an amalgamation of some of the companies already existing and the introduction of larger oil interests will tend to improve the prospects in Trinidad, and enable the industry to assume more stable conditions.

Agreements between oil syndicates and British Government.

An important statement was made in Parliament by Mr. Harcourt, the Secretary of State for the Colonies, on July 31, 1913, in reference to the position of the petroleum industry in Trinidad. The following extracts contain the chief points of interest: 'Two years ago the first shipment of crude oil was made from Trinidad of 3,500 tons. By the end of March last the total production had risen from 202,000 barrels in 1911 to 880,000 barrels, the production for the month of March being 44,500 barrels. At that time seven companies were producing oil, and eight others had been closed down for various reasons. The inadequate production of oil, and the slow development of the industry, have been matters of great anxiety to the Colonial Office and the Admiralty —to the Colonial Office, primarily for the benefit of the colony ; to the Admiralty, for the purposes of the navy ; and to both, for the modern development of oceanic and Imperial trade. . . . We have lately made an agreement with a group representing several important interests in the oil industry. It is called the British West Indies Petroleum Syndicate. Several important British companies, including the Burmah Oil Company and the Anglo-Persian Oil Company, are interested in this syndicate, and only one-fourth of the capital is held by the British Company, which is controlled by the Shell. I am on the point of making an agreement with another important group, representing different but still British interests. They will take over several properties in the island, including one large area on which work has been closed down. I am satisfied that they will have at their disposal ample means to develop all they acquire. Both these corporations will be subject to all the conditions I just now specified as to British control and naval preemption, with special clauses as to continuous and active development.'

Oil in Barbados.

Reference has already been made to the possibility of developing an oil industry in Barbados. The presence of petroleum, or 'green tar', was referred to by Schomburgh in 1847. Mr. Beeby Thompson states there is no doubt of the existence of high-grade petroleum at Barbados, as the oil-beds may be observed out-cropping in the Scotland district, and a small production has occasionally been obtained from drilled wells by the Hon. A. C. Ponsonby and others. It is probable that the steps lately taken to secure a geological exploration of the island will be crowned with success. Recently a Bill has been passed by the legislature authorizing a company to construct and maintain a fuel-oil supply-station at Barbados. Section 13 of the Bill confers on the company the exclusive right of supplying oil for fuel to vessels for twenty-five years, but this provision does not affect in any way the oil produced in the island itself. An oil-bunkering station is proposed to be established also at St. Lucia.

Trade, Commerce, and Transport

Trade relations between Canada and the West Indies.

Proposals for commercial reciprocity between Canada and the British West Indies were under consideration for many years. In 1890 Mr. Foster, then Minister of Finance in the Dominion, visited the West Indies with that object. In 1898 the Canadian preferential tariff which had already been granted to the United Kingdom was extended to the West Indies. It was recognized by the Canadian Government that there were large opportunities for the development of trade between Canada and the West Indies, which they regarded as the natural customers of the Dominion. As the West Indies were then suffering from a very severe depression, Mr. Fielding, the finance minister, claimed that Canada had some Imperial responsibilities in the matter, and with the view of assisting Her Majesty's Government, it was decided to extend the preferential tariff to the West Indies without asking any concessions in return. Under the preference thus granted the produce of the West Indian colonies was entitled on importation to Canada to a reduction of 25 per cent. on the import duty. This was afterwards raised to 33½ per cent. It was at the same time provided that raw sugar, when imported from any British possession, could be entered at the British preferential rates. Refined sugar would be entitled to the same privileges provided the raw sugar from which it was made was grown in a British possession. From 1898 to 1903 the effect of the preference was not appreciable, as there still was a favourable market in the United States, but in the latter year a considerable change took place due to the adoption of the Brussels Convention. This led to the abolition of bounties on European beet sugar and to its admission into the United States free of the countervailing duty hitherto imposed upon it. The West Indian sugar having thus lost its favoured market in the United States was in a position to take full advantage of the Canadian preference.

Another factor still further improved the prospects in Canada; this was the imposition of a surtax on sugar imported from Germany. As a result beet sugar imported from Germany was almost entirely shut out from the Canadian market. The effect of these changes was soon shown in the statistics of the sugar imported into Canada. The importations from the West Indies in 1897 did not exceed 11,000 tons; in 1903 they had reached 50,000 tons; but in the year 1909 they had reached a total of 133,000 tons of the value of £756,206, or 60 per cent. of the total production of all the West Indian colonies.

Negotiations in 1904–8.

The attention thus drawn to the Canadian market led to a renewal of the proposals for a reciprocal arrangement between Canada and the West Indies. In British Guiana in 1903, and in Trinidad in 1904, steps were taken in that direction, but with no practical result. As a consequence of efforts made by the Imperial Department of Agriculture, the Boards of Trade of Toronto, Halifax, and St. John sent a Commission of three delegates to the West Indies to study trade conditions. The report which followed was of considerable interest and value. In the same year the Imperial Commission of Agriculture initiated a more general movement, which resulted in the assembling of a conference at Barbados in January 1908 to consider the steps that might be taken to encourage more intimate trade relations with Canada. This conference was attended by representatives of all the West Indian colonies. The Dominion Government also was represented by two delegates. Resolutions were adopted in favour of entering into negotiations for reciprocal tariff concessions, for the establishment of an improved and cheaper telegraphic communication, and for increased transportation facilities, both by a service of steamers to the West Indies and by rail in Canada.

Royal Commission of 1909.

The next step, which eventually led to the appointment of the Royal Commission, was taken by the Canadian Government, which, in view of the difficulties foreseen in the conclusion of separate reciprocity agreements with the several West Indian colonies, proposed in a Report of the Committee of the Privy Council that the whole subject should be further considered by a conference, organized by Imperial authority in the form of a Royal Commission or otherwise. The Royal Commission was appointed in 1909 with Lord Balfour of Burleigh as chairman, and two Canadian ministers among its members.

The Commissioners, after careful consideration of all the facts placed before them at sittings in Canada and the West Indies, reported (paragraph 32): 'It cannot be denied that the remarkable development of the Canadian market for West Indian sugar, at a time when its practical exclusion from the United States had been becoming apparent, had been of real service in averting that abandonment of sugar cultivation, with its attendant ill-effects on the condition of the labouring classes, which the Commission of 1897 foresaw and dreaded. It appears to be of capital importance to secure by all reasonable precautions that the Canadian market shall not be lost.'

General view of economic development of the West Indies.

The Commissioners were sensible of the danger of dependence on a single industry, and strongly supported a continuance of the efforts that had been made with such signal success to develop other industries suitable to the climate and soil of the West Indies. At the same time it was recognized that the sugar industry was still the dominating factor in such colonies as British Guiana, Barbados, St. Lucia, Antigua, and St. Kitts. It was encouraging to find that in colonies where the natural conditions were favourable for sugar growing, recent events had tended to place the industry on a surer foundation. Slightly higher prices and more assured markets had brought improved credit, with the result that the central factory system was extended everywhere, and more scientific methods of cultivation, including the use of artificial and other manures, and new and improved varieties of sugar canes were being adopted in all the colonies. Attention was also drawn by the Commissioners to the extensive tracts of cultivable land still awaiting development in colonies such as British Guiana, British Honduras, Jamaica, and Trinidad. Where native labour was not available for developing new agricultural industries it was pointed out that a well-organized system of immigration, which had been in satisfactory working for many years, was carried on with the co-operation of the government of India. In this development Canada, no less than the West Indies, was directly interested, as it would lead in the natural course of events to a greater demand for Canadian food-supplies and other goods.

Agreement between the West Indies and Canada, 1913.

The draft agreement between the West Indies and Canada was signed at Ottawa on April 9, 1912. It was afterwards ratified by the Canadian Parliament ('West Indian Trade Agreement Act, 1913') and by the several colonies in the West Indies, with the exception of Jamaica and the non-sugar colonies of British Honduras, the Bahamas, and Bermuda. It came into force on June 8, 1913. In view of the withdrawal of Great Britain from the Brussels Convention and the possible return in some form or other of the continental bounties and cartels, it is generally acknowledged that the West Indies were fully justified in the action they had taken after full consideration of all the circumstances.

With regard to sugar, under the agreement the duty on foreign 96 test was reduced from 83½ cents to 57½ cents, and on British from 52½ cents to 40¾ cents, while on foreign refined the reduction was from $1·26 to $1·08, and on British from 84 cents to 83 cents. The privilege hitherto given to the refiners of importing 20 per cent. of their meltings from foreign sources on the terms of the British preferential tariff was withdrawn; but the refiners were compensated by the reduction in the duty on raw sugar, which was greater than on the refined, and increases their protection from 31½ to 42¼ cents (*West India Committee Circular*, May 20, 1913).

Improvement of communications.

The improved steam communication recommended by the Royal Commission between Canada and the West Indies was not immediately realized in full; there were difficulties in the way, and for the present the West Indies must be satisfied with the new contract, in spite of its many disadvantages. In regard to improved telegraphic communication the recommendations of the Royal Commission have been largely adopted.

Trade relations with United Kingdom.

As already shown, the only industries of importance in the West Indies are those of an agricultural character, and almost wholly in commodities for exportation. From an early period in their history the commerce between the Colonies and Great Britain assumed considerable importance. It is not improbable there would have been little or no diminution in the trade between the West Indies and Great Britain but for the dislocation due to fiscal and other changes in the mother country.

An important factor in the improved condition of the West Indies is the increase of population. In 1791 the population, according to Bryan Edwards, was 521,000. In 1861 it was 1,115,000. In the fifty years from 1861 to 1911 the population has nearly doubled, and according to the latest returns is now 2,062,298. The revenue as shown in the table below[1] has increased from £2,546,724 in 1894 to £3,914,434 in 1911, while the total trade (imports

[1] *Colony.*	*Revenue.*		*Total trade.*	
	1894 £	1911 £	1894 £	1911 £
Trinidad . .	585,905	950,744	3,267,832	9,788,334[a]
Jamaica . .	813,075	1,356,092	4,113,166	5,813,620
British Guiana .	588,245	593,498	3,708,651	3,780,821
Barbados . .	160,624	221,906	2,263,845	2,545,641[a]
Windward Islands	148,186	205,476	940,955	1,395,120
Leeward Islands .	147,357	174,818	881,877	1,280,168
British Honduras	23,215	247,059[b]	515,377	1,145,463
Bermuda . .	32,475	79,249	384,424	679,573
Bahamas . .	47,646	85,592	294,347	520,346
Total .	£2,546,724	£3,914,434	£16,370,474	£26,949,086

Including transit trade.

[b] Including receipts from loans.

and exports) has increased from £16,370,474 in 1894 to £26,949,086 in 1911. This is an increase of 65 per cent. in revenue, and an increase in the aggregate trade of 60·5 per cent. The imports amounted to £14,023,591, and the exports to £12,925,395. Of the imports, goods to the value of £4,692,542 were received from the United Kingdom, and of the value of £9,331,049 from British colonies and foreign countries.

Of the exports, those shipped to the United Kingdom were of the value of £2,403,870 and those shipped to British colonies and foreign countries were of the value of £10,521,525. On the other hand, the all-British trade of the West Indies, in goods received from and shipped to the United Kingdom and British possessions, amounted to £11,225,275, or 42 per cent. of the aggregate trade. The exchange of commodities between the West Indies and the United States, as naturally might be expected from their relative geographical position, has assumed large dimensions. This was inevitable also, because ‘ New York commission houses specialized in West Indian trade, kept large stocks ready for immediate shipment, and were able to meet orders promptly ; and in course of time by rendering financial aid they acquired considerable influence in the West Indies ’. The total trade between the United States and the West Indies in 1911 was of the value of £7,897,813.

Canadian and other commercial connexions.

Since the grant of a preferential tariff the trade between the West Indies and Canada has assumed considerable importance, with the result that there has been some falling off in the trade hitherto carried on between the West Indies and the United States. In 1911 the exports of West Indian produce to Canada amounted to a value of £2,295,035 ; and the imports of Canadian goods into the West Indies amounted to a value of £1,326,110. The total trade, in 1911, was therefore of the value of £3,621,145. It has practically trebled during recent years.

Exports *per capita*.

From the preceding figures it may be gathered that the exports per head of population amount to £6 2*s*., an appreciable increase on the return of previous years. For comparison it may be mentioned that according to an official report issued in Canada the *per capita* exports of France were £5 14*s.* 8*d.*, of Germany £5 11*s.* 6*d.*, and the United States of America £4 9*s.* 1*d.* From the aggregate trade it may be seen that each inhabitant of the West Indies contributes at the rate of £3 4*s.* per head to the trade between the West Indies and the United Kingdom, and at the rate of £5 4*s.* per head to the total British trade.

Exports: sugar and allied products.

Speaking generally, the West Indian exports have preserved their main characteristics for nearly a hundred years. Sugar, in spite of low prices ruling during the continuance of the continental bounties, still furnishes the principal exports of British Guiana, Barbados, Antigua, and St. Kitts, and in view of the recent reciprocal agreement entered into with Canada and the extension of the central factory system, it is not improbable that the sugar exports may increase in importance and value in all the colonies, and more particularly in Jamaica. Latterly, drought and disease have affected the production, but the annual output, on an average of years, may still be placed at about 220,000 tons, or the equivalent in sugar, molasses, and syrup. The export value would be well over £2,000,000. The exports of rum from Jamaica and British Guiana are of the annual value of £349,971.

A favourable market for West Indian sugar, molasses, and syrups is now offered in Canada. As little or no sugar is produced in Canada it is dependent for this commodity on other countries. The imports of raw sugar into Canada during the years 1881–1911 (at ten-years' interval) are as follows:

	Tons.
1881	62,602
1891	101,944
1901	149,530
1911	271,532

As Canada consumes more sugar than is produced in the West Indies there is an assured market for all the production of these colonies. Some raw sugar and yellow crystals are shipped to the United Kingdom; and the United States still takes some West Indian sugar when supplies fall short from Cuba or Puerto Rico.

Cacao, fruits, &c.

The increased exports of cacao is a marked feature in West Indian trade in recent years. The exports from Trinidad, where cacao is now the leading industry, have risen in value from £439,786 in 1891 to £847,416 in 1901, and £1,230,097 in 1911. The exports have therefore nearly trebled in the last twenty years. Cacao forms practically the sole export of Grenada, and is increasing in importance in Jamaica, St. Lucia, and Dominica. The United States take the bulk of the cacao exported from Trinidad and Grenada. A fair quantity is shipped to the United Kingdom, and a share of the large exports of cacao to France, valued at £277,813, probably also reaches London. Practically all the bananas and other fruit produced in Jamaica, forming 58·3 per cent. of the total exports, of the value of over £1,500,000, find a steady market in the United States. A proposal embodied in the new Tariff Bill to place an import tax on bananas landed at American ports has since been abandoned. The Sea Island cotton produced at St. Vincent, Barbados, and the Leeward Islands of the value of £250,000 is all shipped to the United Kingdom to supply the Lancashire mills. Coco-nuts exported from Jamaica and Trinidad to the value of £220,647 find favourable markets in the United States and the United Kingdom. Fresh limes and lime products to the value of £70,790 from Dominica and £41,665 from Montserrat find a fair market in the United States, but the chief market for concentrated lime juice, citrate of lime, and essential oil of limes is in the United Kingdom. The rice exported from British Guiana of the value of £68,000 is all consumed in the neighbouring colonies. In order to illustrate the distribution of the exports of the West Indies it may be convenient to give a summary of the distribution of the produce of the four principal colonies:

Colonies.	*Total Exports.*	*Per cent. distribution of Exports to—*			
		United Kingdom.	*Canada.*	*United States.*	*Other Foreign Countries.*
	£				
Jamaica	2,948,067	14·8	8·4	62·0	14·8
British Guiana	2,172,765	39·89	25·01	20·29	5·87
Trinidad	4,769,486	20·6	8·2	41·8	25·0
Barbados	1,005,931	11·5	48·0	7·5	1·2

Imports. As regards imports, these may conveniently be divided into three categories: (1) food, drinks, and tobacco; (2) raw materials and unmanufactured articles; (3) manufactured articles. The chief food imports comprise flour, salted fish, pickled beef and pork, pulse, rice, and tobacco. The raw material and unmanufactured articles comprise oats and other grain, material for the manufacture of soap and matches, lumber, and petroleum and other oils. Under manufactured goods are included textiles, hardware and manufactures of metal, boots, shoes, and machinery. Speaking generally, the West Indies draw their main supply of food-stuffs, such as flour, fish, salted and pickled, oats, oils, white and pine lumber from the United States and Canada, and their manufactured articles and drinks and tobacco from the United Kingdom. Bacon and ham of the best quality are imported from the United Kingdom, also tea and condensed milk. The United Kingdom is well to the fore in cotton and linen manufactures, fancy goods, silk manufactures, common soaps, spirits, wines, ales, and beer. In a number of articles, such as cordage, rubber goods, glass bottles, hardware, cutlery, jewellery, bicycles, and motor cars the United States are formidable rivals to the United Kingdom. It is interesting to note that in spite of the change of market for many classes of goods, as mentioned above, the West Indian planters continue loyal to the United Kingdom for the machinery required for their central and other sugar factories, cacao driers, and cotton-ginning machines. Every advance in this direction shows that the United Kingdom is foremost in the best manufactures of iron and steel goods. The total value of the jewellery, hardware, and cutlery, iron and steel tubes and pipes, machinery, steam-engines and locomotives imported into the West Indies is probably not less than £1,000,000 annually. Mention may be made of the principal items of imports into the larger colonies. Their value is as follows: Cotton, linen, and woollen manufactured goods, £1,457,175; machinery, hardware, and cutlery, £822,000; wheat flours, £729,148; dried and salted fish, £479,008; lumber, £329,377; boots and shoes, £204,117; petroleum and other oils, £137,069. Condensed milk was imported into Jamaica in 1911 to the value of £53,193. Chemical manures were imported into British Guiana of the value of £133,591, and to Barbados of the value of £105,547. The sources whence the West Indies draw their principal supplies are indicated below:

Colonies.	*Imports.*	*Percentage of Imports received from—*			
	£	*United Kingdom.*	*Canada.*	*United States.*	*Other Foreign Countries.*
Jamaica	2,865,553	45·1	8·5	41·8	4·6
British Guiana	1,786,574	48·49	6·48	24·69	89·6
Trinidad	5,018,848	37·2	7·0	29·3	19·7
Barbados	1,539,710	44·0	11·0	30·0	10·0

Import trade with the United Kingdom and Canada.

In the above table it is shown that the principal colonies continue to take the larger share of their imports from the mother country. It is probable that in the near future Canadian goods will figure more largely in the imports. In 1911 Canada took West Indian produce of the value of £2,295,035, and she shipped to the colonies commodities of the value of only £1,326,110. In the report on the Blue Book of British Guiana, for 1911–12, the Governor states, 'Canada continues to make headway in the local market against the United States with flour. In 1906–7 Canada supplied flour to the value of £11,800. In the 1911–12 report Canadian flour is valued at £45,349.'

In the Trinidad Report it is mentioned that there is a steady growth in the value of imports from Canada. 'It increased from £106,016 in 1909 to £190,287 in 1911, principally in fish, £64,478, flour £58,280, oats £20,473, grain £5,814, cattle food £5,017, and potatoes £4,453.'

In 1910 at Barbados the imports from Canada were of the value of £100,662. When the reciprocal trade between the West Indies and Canada is fully established, and there are improved steam communication and a cheaper telegraph service, there is no doubt that the commerce between the two countries will assume large proportions. As the West Indies is granting identical privileges to imports from the United Kingdom an increase of trade with Canada need not prove prejudicial to the trade in manufactured and other goods with the mother country. As the late Mr. Alfred Lyttelton stated in a lecture before the University of Birmingham in 1910, 'Great Britain has ministered and still ministers to the demands which might be anticipated of new countries. Such countries in the period of their development build railways, sink mines, construct roads and bridges, instil water, supply tramways, electric power and lighting stations. For these purposes it becomes necessary for them to import machinery and tools of all kinds, railway material, telegraph and electric appliances, steel-work for construction, water and gas pipes, and, of course, many other commodities necessary for the comfort and luxury of civilized life.' These remarks apply equally to the West Indian colonies as to other portions of the Empire, and the review of their trade and commerce here given shows that they continue the traditions of the past and still look to the mother country for the appliances with which to extend and strengthen their prosperity.

Transport. Owing to their central position in the western tropics, and their accessibility by steamship communication, the West Indies are remarkably well situated for supplying the varied productions of the tropics on both sides of the Atlantic. With a thriving population of over 100,000,000 in the United States and Canada they have conveniently at hand openings for trade such as are possessed by few of the other possessions of the Empire. In addition they have extensive markets in the United Kingdom and on the continent of Europe.

The West Indies can supply an abundance of the raw material to meet the demands of temperate countries, and in return they are able to obtain the food-stuffs, lumber, and manufactured goods so necessary for their welfare. It is anticipated that the opening of the Panama Canal will tend to increase the importance of these colonies, and still further assist in their development by widely extending the facilities for transport. Jamaica has been aptly described by Captain Mahan as, 'certainly the most important single position in the Caribbean Sea'. The other colonies also will grow in importance and value as the commerce of the world, in which British ships take so large a share, will be constantly passing their doors.

Shipping.

The West Indies have been in regular and close communication with the mother country by means of the Royal Mail Steam Packet Company for over seventy years. The company was incorporated by Royal Charter in 1839. The transatlantic steamers of the company are under contract with the home government, calling at Barbados, Trinidad, Colon, Jamaica, and New York. The voyage from Southampton to New York covers 7,150 miles, and occupies twenty-six days. From Southampton to Barbados takes twelve days. Trinidad is the junction for the intercolonial steamers, and passengers, mails, and cargo are transhipped there for British Guiana to the south, and the Windward and Leeward Islands to the north. The intercolonial service is under contract with the colonial governments. Cargo steamers of the Royal Mail Company leave London monthly for West Indian ports and take return cargoes. Transatlantic cargo services are also maintained from Liverpool and Glasgow at frequent intervals.

The Elders and Fyffes Shipping Co., Ltd., maintain a service to Jamaica direct from Bristol. The Leyland-Harrison line dispatch steamers from Liverpool and Glasgow every ten days; other steamers leaving from London are those of the Demerara and Berbice Steamship Company, Scrutton Sons & Co., direct line of steamers, and the East Asiatic Company, Limited. Trading in fruit between New York and Jamaica are the Hamburg-American Line, the

United Fruit Company, and the Atlantic Fruit Company. The Quebec Steamship Company's steamers sail about every ten days from New York to the Leeward and Windward Islands, Barbados, and British Guiana; and the steamers of the Trinidad Shipping and Trading Company leave New York every twelve days for Grenada, Trinidad, and Tobago. The Canadian and West Indian steamship services have lately been renewed. There is a direct service with Bermuda and Jamaica and a subsidized fortnightly service from St. John, New Brunswick, and Halifax, Nova Scotia, to the Lesser Antilles and British Guiana. In crop time additional steamers are engaged to carry sugar and molasses to Canada.

At Jamaica, British Guiana, Trinidad, Grenada, and Dominica small coasting steamers serve to distribute goods brought out by the larger steamers, and supply return cargoes.

Tourist traffic.

In addition to the numerous facilities, mentioned above, for the interchange of commodities between the West Indies and the outer world, an increasing tourist business is being developed with these beautiful and historic possessions. The tourist season extends from the end of November to April. Some of the leading steamship companies, such as the Royal Mail Steam Packet Company and the Hamburg-American Line, organize series of tours, with large and well-equipped steamers of 10,000 to 12,000 tons, during the winter months from England and New York. Jamaica, Bermuda, the Bahamas, Barbados, Trinidad, and the Windward and Leeward Islands are favourite places of resort for the overseas visitors. The Governor of Barbados in his Report for 1910–11 mentions that 'the Colony owes much of its increasing prosperity to the visitors who stay in the island'.

Railways, roads, and waterways.

As regards internal means of transport, most of the larger colonies possess railways, which conveniently supplement the work of the coasting steamers. There are also electric tram-lines, and with few exceptions the roads are maintained in good order. Motor-cars are in general use in Jamaica, Trinidad, and Barbados. The Jamaica Government Railway, 184 miles, taps several rich agricultural districts. It is reported to be efficiently managed. In 1912 the gross revenue was £190,007 and the gross expenditure £97,829. In the Blue Book Report for 1911 it is mentioned that ‘the great and increasing importance of the banana traffic is clearly indicated’. The total length of the main road system in Jamaica is 1,994 miles.

British Honduras depends on its numerous water-ways for bringing down mahogany, cedar and logwood, and carrying back supplies to the interior. A short railway, 25 miles, has recently been constructed at Stann Creek for bringing down bananas for shipment to New Orleans.

British Guiana utilizes, as far as it can, its large rivers for communication with the interior lands. The existence of rapids and falls obstructing the navigation has already been mentioned. Along the coast there are two lines of railway running east and west, a distance of 65½ miles. A short railway, 18½ miles, connects the Demerara River with the Essequibo River, above the first rapids at Wismar to provide access to the Potaro gold-fields. The coast roads running parallel (within a mile or so) of the sea, measure 268 miles, and are provided with bridges and steam ferries.

Trinidad possesses three lines of railway extending for 90 miles east and south. There are 12¼ miles of electric tramways in the neighbourhood of Port of Spain. Barbados is distinguished for its numerous and well-kept roads, which render every portion of the island easily accessible. There is a light railway, 24 miles, connecting Bridgetown with St. Andrews. A large portion of the inland transport is in the hands of freighters or small contractors. In the Windward and Leeward Islands, the sea, especially on the sheltered leeward coast, is the natural highway, and several small craft, in addition to the coasting steamers, are engaged in bringing in produce for shipment. There are also well-kept coast roads for wheeled traffic.

CHAPTER XV

THE FALKLAND ISLANDS AND THEIR DEPENDENCIES

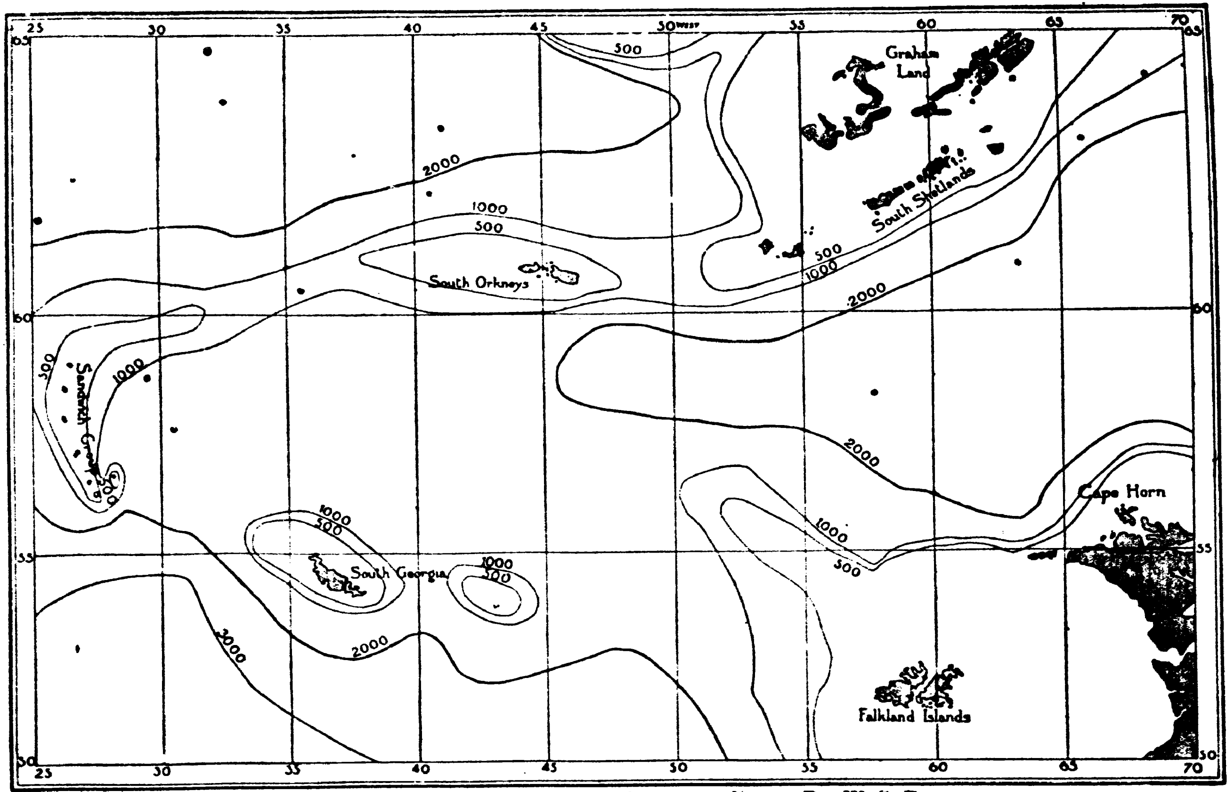
BY DR. WILLIAM S. BRUCE

Position and political connexion.

THE Falkland Islands, South Georgia, the Sandwich Group, the South Orkneys, and South Shetlands are islands united geographically by a submarine ridge or 'rise' that at one time joined the Andes of South America to Antarctica, and consequently they may be termed the Andantarctic Archipelago. Until recently the Falkland Islands alone were British, partly because they were occupied by British shepherds and partly on account of their strategic value. Now they are valued commercially rather than strategically, and the other islands mentioned have been made dependencies of the Falklands as well as the Graham Land extension of Antarctica. This is due to the development of whaling, the direct result of various scientific expeditions, and more particularly to the reports of the naturalists on the Scottish whalers in 1892–3, and to the researches of the Scottish National Antarctic Expedition of 1902–4. This debt to scientific research is not too readily acknowledged by those who have made their fortunes in whaling.

Early settlement.

The discovery of the Falkland Islands is generally attributed to Davis in 1592, but there is reason to suppose that previously to this they had been found by some unknown foreign navigator. In 1594 Sir Richard Hawkins, in ignorance of 'Davis' Southern Islands', called them Hawkins' Maiden Land, after sailing along their northern coasts, but the name by which the islands are now known was given them in 1690 by Captain Strong in honour of Lord Falkland. In the early part of the eighteenth



John Mathieson, del.

FIG. 14. **The Andantarctic Archipelago according to Dr. W. S. Bruce.**

century they were frequently sighted by French ships sailing between St. Malo and the Pacific, and hence the French name for the islands, Iles Malouines. The French in 1764 were the first to found a settlement on these uninhabited islands, but a few years later France sold her rights to Spain for £25,000. In 1765, however, the islands had been taken by Britain and a colony started. After many disputes as to the ownership of the islands, Spain relinquished her claims in 1771. The British colony was withdrawn in 1774, but Britain maintained her claim to the islands. The government of Buenos Aires at one time tried to maintain a claim on the grounds of previous Spanish ownership, but withdrew from that attitude in 1833. In the early part of last century the Falklands were again uninhabited, but colonization began once more in 1820. In 1833, when the *Beagle* visited these islands, Darwin found the officer in charge at the head of a population of which, he maintains, 'rather more than half were runaway rebels and murderers.' Darwin's description of these islands, however, except for general topography and natural history, is erroneous, and he subsequently acknowledged that he took 'an exaggerated view of the badness of the climate of these islands'. From the naturalist's point of view, however, his account in *The Voyage of the 'Beagle'* is well worth perusal.

Physical features.

The Falkland Islands and their dependencies are an archipelago lying between 51° S. and 63° S. (cf. the British Isles between 50° N. and 61° N.). They lie between 27° 30′ W. and 62° 35′ W. (cf. the British Isles from 2° E. to 11° W.). Port Stanley, the capital, is situated in 51° 41′ S., a latitude almost identical with that of London, 51° 30′ N., in the Northern Hemisphere. It lies, however, in 57° 51′ W. longitude, that is, as far west as Newfoundland.

The Falkland Islands.

The Falkland Islands are 300 miles from the Patagonian coast. South Georgia lies 850 miles to the east-south-east of the Falklands, the South Sandwich Group 300 to 400 miles south-east of South Georgia, and the most southerly of them, Southern Thule, is 550 miles east-by-north of the South Orkneys. The South Orkneys are, however, only 650 miles south-east of Port Stanley, 450 miles south-west of South Georgia, and 250 miles east of the South Shetlands. The South Shetlands, separated only by a relatively narrow channel, Bransfield Strait, from Graham Land, are 550 miles to the southward of the Falkland Islands.

The Falkland Islands are the only part of the And-antarctic Archipelago which has been more or less completely surveyed, consequently the area of the archipelago is uncertain, but it may be estimated at about 10,000 square miles, excluding the interior of Graham Land. In the vicinity of the wintering stations of the several scientific expeditions parts of the South Orkneys, South Georgia, and the east and west coasts of Graham Land have also been surveyed in detail, while to these same expeditions is the credit due of furnishing us with what we know, not only of the natural conditions, but to a very great extent of the economic value of this outlying archipelago and farthest south British colony.

Number, extent, and physical character.

The Falkland Islands consist of two large islands, East Falkland (3,000 square miles), and West Falkland (2,300 square miles), and about a hundred small islands, making the total area about 6,500 square miles. The country presents much the same appearance as many parts of the West Highlands of Scotland. The surface is an undulating moorland broken in parts by quartzite ridges and peaks rising above a peat-covered land. The highest point is Mount Adam, 2,297 feet. The coasts are indented with numerous inlets and creeks ramifying far inland and forming excellent harbours. The town of Port Stanley is situated on one of them—a harbour of refuge well known to sailing vessels that have been dismasted or otherwise severely damaged in their passage round Cape Horn.

South Georgia.

South Georgia is 120 miles long from north-west to south-east and about 30 miles broad. It is much more mountainous than the Falklands, the axial range rising to nearly 8,400 feet. Many sea-lochs form excellent harbours and are continued inland as glens with glaciers at their heads, while in some parts, especially in the south, the glaciers reach the sea.

Mr. David Ferguson, who resided in South Georgia during 1912–3, has made a careful study of its general structure, and describes the coasts as rock-bound and more or less precipitous. Owing to the recession of glaciers, there are several patches of detrital flats and moraines inside rock-channels scooped out by glacial action. The coast has generally a stern and rugged appearance not unlike parts of the north-west Highlands of Scotland. 'Along the north-east coast-line,' he says, 'running from north-west to south-east, the outer escarpments are succeeded inland by rocky heights, having ice-fields in every hollow, and eventually culminating in the central or Allardyce Range of mountains. The central range, except in steep rock escarpments and splintery crests, is covered with permanent ice-fields and snow.

'Mount Paget, the highest point of the central range, 8,383 feet above sea-level, has almost vertical escarpments of gnarled rusty-brown rocks to its summit, surrounded by ice-fields and glaciers, slowly moving down to the edge of the Nordenskjöld Moraine Fiord and Moraine Flat Glaciers in Cumberland Bay.

'Looking up Cumberland Bay on a fine clear day, rather an event in South Georgia, we have a magnificent view of the steep walls of uniformly bedded and stratified rocks, which run into narrow chasms and gorges, like Moraine Fiord, and rise into frowning reddish-brown ramparts and walls, to the crest of Mount Paget, the Sugar loaf, and the Nordenskjöld Peak. The red-brown colour of the rocks is contrasted perfectly with the sparkling white of the ice-fields and glaciers, and presents to the eye a view of lake and mountain scenery at once grand and picturesque.'

Dr. Carl Skottsberg describes the island 'as giving a strong impression of being part of a mountain chain, one of the broken links of the "Antarctandes", rising abruptly out of the ocean, a very broken crest of considerable height with numerous steep peaks of which at least Mount Paget reaches 2,000 metres.

'A large area of the island is glaciated, but there is no inland ice-cap, glaciation being of an Alpine type with numerous large glaciers that descend into the valleys from the hill-tops. There is not much foreland, the lowland being found in strips round the sea-lochs. The lower mountain sides are covered with débris of stones, and slips often occur in many steep places'.

South Orkneys. The physical features of the South Orkneys are similar to those of South Georgia, but the mountains are not so lofty, and the land is much more completely ice-covered. The South Orkneys consist of two large islands, Coronation Island and Laurie Island. The *Scotia*, the vessel of the Scottish National Antarctic Expedition, wintered there in 1903, and Laurie Island was surveyed in detail. It is remarkable for a number of narrow peninsulas, which separate striking sea-lochs and deep bays from each other. Laurie Island, except in the east, is composed of a series of mountain ridges, crests of a sunken mountain system rising to 2,000 feet above the sea. The land is very heavily glaciated from the summits to the sea, and the coasts are extensively fringed with ice-faces. Coronation Island presents an exactly similar appearance, but is loftier, its mountains being said to reach an altitude of 5,000 feet. There is nearly always a considerable body of pack-ice in the vicinity of the South Orkneys, and sometimes it is very heavy and tightly packed, making it difficult for even a vessel protected against ice to reach them.

South Sandwich Group.

Very little is known of the South Sandwich Group. It consists of a chain of half a dozen small islands lying in a north and south direction between 56° S. and 60° S. and between 26° W. and 27° W.; at least one of the islands, Candlemas, is reported to be an active volcano, and Bristol Island is said to have a good harbour for small craft.

South Shetlands and Graham Land.

The western islands of the South Shetlands are fairly well known, as well as the east and west coasts of Graham Land—the northern extension of Antarctica. These regions reflect generally in inverted form the southern extension of South America. The Andean Chain repeats itself and tends to run along the west of Graham Land just as it does along the west of South America, forming a precipitous coast broken into deep sea-lochs and coastal archipelagos of rocky islands, whereas the lower lying slopes and plains extend to the east. The main difference is that whereas South America is almost free of glaciers Graham Land is almost completely ice-covered.

Geology.

The Falkland Islands are almost entirely of Devonian formation, the fossil fauna being of Lower Devonian age.

'The oldest rocks are coarse-grained arenaceous sediments resting unconformably on the eroded surface of an Archaean basement at Cape Meredith. These probably correspond to the lowermost members of the Cape system, the Table Mountain series of quartzites and sandstones, which, like the Falkland Island rocks, are without fossils. The fossiliferous middle division of the Falkland Devonian consists of soft, fine-grained sandstones and slate, which occupy most of the large areas of low ground and the valleys of the highlands. The fauna of this corresponds very closely with the Bokkeveld of Cape Colony, showing less intimate relationship with the lower Devonian found in several parts of the South American continent. Finally come the uppermost Falkland Devonian, hard, coarse sandstones and quartzites, invariably forming hills and ridges of the middle and northern parts of West Falkland, and in the northern part of the East Island. To this series the rocks in the neighbourhood of Port Stanley belong. The Southern half of East Falkland and a small patch at Hill Cove in West Falkland belong to a formation younger than the Devonian with the fossil flora of the southern palaeozoic continents' (Dr. Harvey Pirie).

During sub-glacial conditions, with a large amount of snow melting, there was a process of what is termed solifluction, such as is seen in certain Arctic lands (e.g. Bear Island) when the weathered surface waste material, saturated with water, becomes a semifluid mass of rock slabs, fragments, gravel, and fine mud. This mud-glacier, as it has been termed, tends to move slowly down hill, and comes to rest in the lower parts of the valleys. Subsequently, when water has washed away the greater part of the finer material, only a residue of coarse rocks is left, which to-day form the wonderful Stone Rivers of the Falkland Islands.

While there are no glaciers in the Falkland Islands the glens of South Georgia, in almost the same latitude, are filled with glaciers, many of which reach the sea. By far the greater part of the South Orkneys is covered with ice.

South Georgia and the South Orkneys resemble each other in many respects. Both appear to be peaks of a sunken land-mass of similar age, once much more extensive. Their hills rise into sharp peaks. Their shores are indented with deep sea-lochs, but good harbours are scarce. The rocks of the South Orkneys correspond in age to the Hartfell shales of the Upper Ordovician and the basal shales of the Silurian. Those of South Georgia, if not of the same age, are at least older than the Upper Palaeozoic (Pirie, *Report on the Scientific Results of the 'Scotia'*, vol. viii).

'Whilst,' says Dr. Pirie, 'the most recent earth-movements at the South Orkneys have been in favour of the land, there must have been previous to that much more extensive depression. The evidence of this is, of course, as is usual in such cases, more indirect, but pointing to it we have :

1. The general outline of the islands, which is that of a sunken land.
2. The presence of a fairly wide 200-fathom shelf, with beyond it a rapid drop to 2,000 fathoms.
3. The fact that the islands are composed of sedimentary rocks along with the presence of other rocks of not very remote affinities in South Georgia and the Falkland Islands, suggesting that they are all fragments of a once extensive land.
4. More conclusive and recent evidence is provided by the fact that many of the off-lying rocks and islets show signs of having been over-ridden by the ice-sheets of the mainland. This greater extension of ice could only have taken place with a more extensive land surface ; neither greater precipitation nor less ablation than at the present day (with the present land surface) could account for it.'

Dr. Gunnar Andersson is of the opinion that further exploration of the South Shetlands may reveal a connecting link between the western Shetlands and their eruptive rocks folded along a north-east and south-west axis and the South Orkneys with their ancient sedimentary rocks folded along a north-north-west and south-south-east axis. Dr. Pirie, however, thinks that 'the relationship of the South Orkneys will be found to be more intimate with the islands to the N.W. and N.E. than with those of the west'.

'The relationships', says Dr. Pirie, 'of these widely separated areas, with deep water intervening, are still highly speculative. It may be that the main Andean axis, already turning eastwards in Southern Patagonia and Tierra del Fuego, is continued in this direction south of the Burdwood Bank, and then curves southwards between the South Orkneys and South Georgia. In this case the Silurian rocks of the South Orkneys may be related with the Silurian rocks occurring on both sides of the main Andean chain in Bolivia and Northern Argentina, and in the province of Buenos Aires, in the Sierra Tandi and Sierra de la Ventana.

'The Falkland Islands present an analogy to the Argentine *Praecordilleras* and the Sierras *Pampeanas*, a border zone between the ancient Gondwana land-mass and the Andes, with the important exception that the folding in the Falklands disappears rapidly towards the south, i.e. the central cordillera, a feature which is difficult to reconcile with an extension of the Andean structures eastward through a curve to the Sandwich Group and thence via the South Orkneys to Graham Land.

'On the other hand, the Falklands present many points of agreement with the South African formations of similar age, although they cannot be considered as having the same position in regard to the leading tectonic lines of the earth. It may be, however, that they are, along with South Georgia and the South Orkneys, fragments of an ancient "Flabellites land".'

Graham Land was the first part of Antarctica from which definite information was obtained regarding the age of its rocks. In 1893 Dr. C. W. Donald brought home, on board a Scottish whaler, the *Active*, Tertiary fossils from Seymour Island. Subsequently the researches of Swedish, Belgian, and French explorers have elucidated the geology of this part of the continent and its adjacent islands, including the South Shetlands. Both the west coast of South America and the west coast of Graham Land are made up of the same kind of folded rocks, gneisses, granites, &c. Along the east of these in both lands there are sedimentary rocks of more recent origin with plateau formation, and there is a tendency for active volcanoes to appear.

Climate. A striking difference of climate exists between the Falkland Islands and South Georgia on the one hand and South Orkneys, South Shetlands, and Graham Land on the other, the thermal gradient being very steep. The climate of the Falkland Islands is much more salubrious than that of South Georgia, in spite of the fact that the north coast of South Georgia is little more than a degree farther south than the south coast of the

Falklands. A glance at the Admiralty ice-chart, however, shows that whereas the Falkland Islands lie well outside of the average limit of drifting ice, South Georgia is well within the limit which reaches 40° S. in that longitude.

Precipitation is practically all in the form of rain in the Falkland Islands, in South Georgia it is more often in the form of snow, and in the South Orkneys, South Shetlands, and Graham Land it is nearly all in the form of snow.

In his consideration of 'The Weddell Quadrant and Adjacent Areas' (*Rep. Scient. Res. of 'Scotia'*, vol. ii) Mr. R. C. Mossman says that in the 'Falkland Islands we find a strictly oceanic climate, viz. strong winds, equable temperature, and a moderate rainfall, which last, however, is probably much greater on the West Falklands than at Cape Pembroke, the station here quoted. A noticeable feature here is the large amount of sunshine recorded. Between the Falklands and South Georgia, which lies only 2° to the south, but some 22° to the east, a great difference is found. Here the influence of the Antarctic drift makes itself felt, the mean annual temperature being 8° lower than at Cape Pembroke, or at Staten Island. However, as regards sunshine and wind force, the two stations are almost identical. At the South Orkneys the influence of the Antarctic drift is for the first time the predominant factor affecting climate. Here, in the low latitude of 61° S., the mean summer temperature is below freezing point, while in the winter readings below – 40° F. have been recorded. Perhaps the most striking example of the effect of the Antarctic drift on the climate conditions in low latitudes as compared with the North Polar Regions occurs during summer. At this season the isotherm of 34° between the long. of 10° E. and 50° W. nowhere protrudes farther south than 58° S., and falls to about 52° to the east of the meridian of Greenwich. The most southerly extension of this isotherm in the Arctic is in latitude 74° N., long. 16° W., while to the north of Spitsbergen it lies in latitude 81° N., long. 10° E. Thus on this meridian of 10° E. the summer isotherm of 34° is located only 540 miles from the North Pole, but, as we have seen, quite 2,300 miles from the South Pole. Such is the great effect of the Antarctic drift-ice in the lowering of temperature.'

Hydrography: local.

Local hydrographical knowledge of the Falkland Islands consists of a detailed survey of its coasts, with several thousand soundings around the main islands, in the creeks and channels, and between the hundred islands. In addition to the detailed land survey of Laurie Island (South Orkneys), the *Scotia* took over 500 soundings in the sea-lochs of Laurie Island, especially in Scotia Bay. A considerable number of soundings have similarly been taken around South Georgia and in the neighbourhood of the Belgian, French, and Swedish scientific stations on the west and east coasts of Graham Land. These expeditions have also done good work on the physics of the sea in the vicinity of the places named. In the Falkland Islands, however, few physical observations of the sea have been taken, mainly because these scientific expeditions were not planned to do work in these parts, but farther to the south. Although for many years the Falkland Islands was a naval station for the South Atlantic, the ships of the Royal Navy have done practically nothing to investigate the physical conditions of the sea. They have confined themselves to soundings in the shallower waters.

Hydrography: general

It was left for the *Scotia* to inaugurate this physical and general deep-sea work during the years 1902–4, and additional information has been obtained by the German *Deutschland* expedition which returned from the Weddell Sea at the end of 1912.[1] These investigations, and those of the Swedish vessel *Antarctic*, have shown that there is a rise, or submarine ridge, of less than 2,000 fathoms, which unites South America with Antarctica by way of Tierra del Fuego, Falkland Islands, South Georgia, Sandwich Group, South Orkneys, South Shetlands, and

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[1] A full consideration of the work of the *Scotia* will be found in the *Report on the Scientific Results of the Voyage of S.Y. 'Scotia'*, and a full account of the German work will be published shortly.

Graham Land. Almost certainly at one time this 'rise', if not entirely above sea-level, was so to a great extent, and formed a land bridge between South America and Antarctica. Weddell, speaking of the South Orkneys, says, 'The tops of the islands, for the most part, terminate in craggy towering peaks, and look not unlike the mountain tops of a sunken land.' Such was the impression of an intelligent seaman who was certainly not a geologist, but it is interesting to note that this layman's opinion is exactly the same as that of geologists, for Dr. Pirie says of the South Orkneys and of South Georgia, that 'both appear to be peaks of a sunken land-mass of similar age once much more extensive'. The accompanying map shows the bathymetrical conditions as far as they are known at the present time.

It may be noted that the Archipelago lies practically entirely within the region of the great easterly drift which sweeps from the west through Drake Strait and continues its course round the Southern Hemisphere. On the other hand, to the south of the Andantarctic Archipelago, in approximately 65° S., the drift appears to be westerly until it strikes the east coast of the probable land-mass of New South Greenland. It then turns northward until it mingles with the easterly drift to the south of the South Orkneys. Detailed investigations of the temperature and salinity of these seas have been made by the expeditions on the vessels *Scotia*, *Antarctic*, *Deutschland*, *Belgica*, *Français*, and *Pourquoi-Pas ?*, but these investigations have not yet been fully worked up and appear to be very complex. One point of interest, however, is that in Bransfield Strait, between Graham Land and the South Shetlands, there has been recorded one of the lowest bottom temperatures yet taken, while the *Challenger* investigations showed that a bottom layer of cold water, which evidently comes from the Antarctic regions, flows northward along the Brazilian coast.

Vegetation.

In Graham Land, the only two flowering plants known in the Antarctic regions were discovered by Dr. Charcot's Expedition in 1904–5. One of these, a grass, is known in the South Shetlands, but otherwise these lands, including the South Orkneys, have no phanerogams. The flora comprises many species of mosses and lichens and a considerable number of unicellular algae. Some marine algae also occur quite plentifully in places where the sea-ice does not rub them off the rocks over which it grinds with the tide and weather. In South Georgia, however, there are, besides algae, lichens, and mosses, a number of ferns and no less than fifteen species of flowering plants. Tussock grass grows quite luxuriantly. The Falkland Islands have a still richer flora, no less than 143 species of phanerogams having been recorded.

> This archipelago is of very special interest in relation to the Antarctic flora, for Dr. Rudmose Brown points out [1] that 'while our knowledge of Antarctic flora is certainly incomplete, all the known facts point to a Fuegian origin. Not only does an analysis of the distribution of the constituent elements indicate this, but the relative greater abundance of species in Graham Land and its vicinity than in Victoria Land, as well as the absence of New Zealand forms, shows that the flora of the Antarctic is due to an emigration of species from Fuegian lands. . . . Winds and birds must have done the work of giving Antarctica its present flora, *via* Graham Land from Fuegia and thence it must have spread westward *via* the coasts to Victoria Land, but naturally only a small proportion of the species were carried so far. However, it is quite possible that by the same agencies a certain number of mosses and lichens may have reached Wilkes Land and Wilhelm Land from Kerguelen and Heard Island, while South Georgia and the South Sandwich group may have contributed to Coats Land and the coast eastward towards Enderby Land. The floras of all these sub-antarctic islands from the Falklands eastward to Kerguelen have been shown to be related to one another, and to have strong Fuegian affinities.'

South Georgia has a short cold summer during which snowstorms are frequent, and a long winter with much snow, now and then interrupted by short periods of summer weather. Precipitation in South Georgia is mostly snow. It is evident that, in a place so little favoured, the exposure towards the different points of the compass will play a very important part in determining whether the snow accumulated during the winter will melt during spring and summer, and consequently in the distribution of plants. In many places the snow is carried away by the gales, thus the moraine plains in Cumberland Bay along the Moraine Fiord, as well as in the West Fiord, are swept by strong winds and probably often laid bare, which fact partly accounts for the sparseness of the tundra-meadow and the predominance of moss- and lichen-tundra.

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[1] *Report Scient. Res. of 'Scotia'*, vol. iii.

A climate like that of South Georgia greatly favours the formation of peat. Species of *Sphagnum*, always comparatively rare in sub-antarctic lands, are entirely absent, but peat-forming representatives of *Polytrichum*, *Dicranum* constitute one of the most prominent features of land vegetation. The two most important phanerogams, *Poa flabellata* and *Festuca erecta*, also give rise to a kind of peat.

> 'Of sub-antarctic lands South Georgia perhaps resembles the Arctic regions more than do the others, for instance the Falklands. Here the much less pronounced periodicity of vegetative phenomena is especially striking, there is a very large proportion of evergreen species that keep fresh and vigorous throughout the winter, with or without a protective snow-cover. There are all sorts of chamaephytes of caespitose habit, cushion-plants, dwarf-shrubs, perennial herbs with creeping rhizomes or forming dense mats, &c. . . . They cannot count on a prolonged rest in the winter as can Arctic plants; after some days with snowstorms and slight frost may follow others when the soil is thawed and the plants are awakened to life for a short time.'

Animal life: mammals.

The most important animals at the present time associated with the Andantarctic Archipelago are the Cetacea. To whales the colony owes chiefly its present prosperity. There are hundreds of thousands of these greatest of all mammals. The writer records in Burn Murdoch's *From Edinburgh to the Antarctic*, that on the 16th of December (1892), when his vessel first met ice it passed among thousands of finner whales. Many came quite close to the ship, and as far as the eye could reach in all directions, one could see their curved backs, and see and hear their resounding blasts. Euphausia swarmed in the water. Many Blue Petrels and myriads of Cape Pigeons were flying around and settling on the surface. This gives an idea of the prominence of whales as members of the fauna of the seas of this scattered and far southern British archipelago. The chief species of whales found in seas adjacent are as follows: 1. Southern Right Whale (*Balaena australis*). 2. Rorqual, Fin Whale, or Razor-back (*Balaenoptera musculus*). 3. Sibbald's Rorqual, Blue Whale, or Sulphur-bottom (*Balaenoptera sibbaldi*). 4. Rudolphi's Rorqual, or Seihval (*Balaenoptera borealis*). 5. Humpback Whale, or Long-armed Whale (*Megaptera boops*). 6. Sperm Whale or Cachalot (*Physeter macrocephalus*). 7. Pilot Whale, Laing Whale, or Round-headed Whale (*Globiocephalus melas*). 8. Grampus or Risso's Dolphin (*Grampus griseus*).

The only land quadruped of this archipelago was a larger wolf-like fox (*Canis antarcticus*) which was only to be found on the Falkland Islands. It appears to have been a peculiar species, and when Darwin visited the islands was common to both East and West Falkland. Between his visit, however, and that of the *Challenger* thirty years later the animal had become extinct—a most regrettable circumstance, because there appeared to be 'no other instance', says Darwin, 'in any part of the world of so small a mass of broken land distant from a continent possessing so large an aboriginal quadruped peculiar to itself.' Darwin's forecast is of interest when he says, 'within a very few years after these islands shall have become regularly settled, in all probability this fox shall be classed with the dodo, as an animal which has perished from the face of the earth.'

The only other native mammals that live in the Falklands are the sea-lion (*Otaria*), and the fur seal (*Arctocephalus*). The sea-elephant (*Macrorhinus*) is also not an infrequent visitor, and occasionally some of the Antarctic true seals visit the coast.

Man has, however, introduced other mammals, the rabbit, the common rat, the common hog, which is now rare, and a field-mouse. In Darwin's time a vast number of wild cattle and horses covered the land. Now these have all been killed out and replaced by the more profitable sheep, with the exception of one or two herds in the most inaccessible islands.

Bird-life is plentiful. Penguin rookeries are to be found in many places, and have to be protected from the depredations of man. Gulls, shags, skuas, geese—Kelp, Brent, and Upland—the steamer duck, oyster-catchers, herons, and the like, are plentiful around the coasts and in every creek and sea-loch, while quite a number of land birds are to be found inland. Upland geese have become too numerous, probably owing to the extinction of the fox, and legislation has been passed for their diminution; and owing to the damage done to sheep by turkey buzzards, carranchos, and johnny rooks, the number of these birds is also being reduced, a price being paid for their beaks, which is certified by a 'Receiver of Beaks'.

Fish abound in the creeks and harbours, and during 1904 the *Scotia* naturalists fell in with numerous shoals of herring (*Clupea fuegensis*). There is a very rich marine invertebrate fauna, a special study of which has been made by Darwin, Valentine, the naturalists of the *Scotia*, and others.

Economic and Social Conditions

Pastoral industry. The main industry of the Falkland Islands is sheep-farming, the land supporting over 700,000 sheep. These sheep have been bred mainly for wool, but during the last three years two canning factories have begun work capable of dealing with 600 and 300 sheep daily; in 1912 about 46,000 sheep were canned or boiled down. The demand for sheep of good weight is steadily increasing, both for the canneries in the colony and for export.

Whaling. The advent of whale-hunting, which has, as already stated, followed the scientific investigation of these regions, has not only increased the commercial importance of the Falkland Islands but has made its island dependencies a valuable commercial asset. The wintering of the Scottish expedition in the South Orkneys, of the Swedish expedition on the east coast, and the French expeditions on the west coast of Graham Land, and the work they have done in cartography, meteorology, and zoology have all led to this commercial development. The whalers would certainly not have been there at the present time but for the pioneer work of these expeditions, and the special reports that one and all brought back of the presence of whales in enormous numbers in those seas, and of excellent harbours wherein to secure the products of these valuable cetaceans.

In spite of urgent endeavours as early as 1893 and some years subsequently made by British subjects to start whaling on modern lines in the waters of the colony and its dependencies, it was left, owing to the apathy of the home authorities, to Norwegian and Argentine enterprise to start a whaling industry that has proved such an important commercial asset. The total value of the products of this industry during 1912 was £886,795, and for 1913 was estimated at £1,350,000 (up to September 30), and of this by far the greater part is derived from South Georgia, the South Shetlands, Graham Land, and the South Orkneys.

One company in the Falkland Islands during 1911–12 produced a total of 2,444 barrels of oil. In South Georgia eight companies are now established. They employ 1,000 men in their factories ashore and afloat. During 1911–12 172,000 barrels of oil, 81 tons of whalebone, and 30,270 bags of guano were produced. The South Orkneys and the Sandwich Islands were each visited by one company, and ten companies held licences for the South Shetlands and Graham Land. These accounted for 152,770 barrels of oil and 403 tons of whalebone. In South Georgia, in 1911, 7,000 whales were brought in, i.e. about 50 per cent. more whales and nearly 40 per cent. more oil than the total result of the combined efforts of the whole whaling fleet operating in the northern industry.

It is interesting to note that, 'altogether the total catch (1911) of the eighty-six steam whalers operating in the Southern Hemisphere was about 17,500 whales, yielding about 500,000 barrels of oil, representing a gross value of about £1,175,000.'[1] The season 1911–12 yielded about 327,000 barrels of oil, and the gross value of the fisheries was about £887,000.

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[1] T. Salvesen, 'The Whaling Industry of To-day,' *Scottish Bankers' Magazine*, July 1912

White fisheries.

There is reason to believe from investigations made by the *Scotia* in 1903 that there might be profitable white fishing carried on in the waters of this colonial archipelago, such as is carried on in northern latitudes, but the British have not undertaken it, although Uruguay and Argentina are now making special efforts to investigate the fishery resources of the South Atlantic.

Sealing.

Sealing is also carried on in the most casual way, although the fur seals are more or less protected by law. Owing to the remoteness of many of the rookeries from head-quarters, depredations are not infrequent, which, unless checked, may result in the extermination of the fur seal. It is a question, however, how far the sea-lions (*Otaria jubata*) occupying many islands might be replaced by more profitable fur seals.

No mining is carried on in the colony.

Transportation-shipping.

In 1912, 88 steamers with a tonnage of 186,979, and 12 sailing ships with a tonnage of 10,824 tons entered Port Stanley. Most of these latter came for repairs.

Trade.

The value of the imports of the Falkland Islands, exclusive of their dependencies, for 1910, 1911, and 1912 was about £94,000 a year, while exports rose from £309,000 in 1910 to £471,000 in 1911 and £623,875 in 1912. This large increase is almost entirely due to the whaling industry. The exports are chiefly to the United Kingdom and Norway. In addition to these exports, whale oil and guano, valued at over £433,000 from South Georgia, £427,000 from the South Shetlands and Graham Land, and £19,000 from the South Orkneys, were exported in 1911–12 to the United Kingdom and Norway.

Port Stanley is distant 8,130 miles or twenty-seven days from Liverpool. In 1912 over 169,000 postal packets were dealt with at the Falkland Islands.

Postal and telegraph service.

The commercial importance of South Georgia is indicated by the fact that there is now a regular mail-service between this island and Buenos Aires, at a distance of

1,500 miles, for which a subsidy was offered by the Colonial Government, but refused. In 1911 there were fourteen mails, the total number of postal packets received and dispatched in 1911 was 25,325, an increase of 16,979 over 1910.

The hitherto isolated state of the colony has terminated by the erection and opening in September 1911[*] of a wireless telegraph station two miles from Port Stanley, capable of communicating at night with Buenos Aires or Monte Video. Until the present time telegrams have been forwarded from Buenos Aires by post.

Population. The census of 1911 showed the population of the Falkland Islands to be 2,772, increasing as follows from 1881: 1881 = 1,553, 1891 = 1,789, 1901 = 2,043, 1911 = 2,264: to the population of the Falkland Islands must be added the population of South Georgia, which in 1911 was 1,003, making a total of 3,275. This large increase of population, mostly Norwegians and Swedes, since 1901, viz. over 60 per cent., is due to the development of the whaling industry, and it should be mentioned that after March, during the winter, the greater part of those men employed in the floating factories of South Georgia leave.

Out of the total of 3,275 the total number of males is 2,370, and of females 905, or an average of only 38·2 per cent. of females; in 1901 the percentage was 69·8. This is on account of the large number of men employed in the whaling industry. The population of Port Stanley in 1911 was 905, practically stationary.

In 1911 there were 1,421 British subjects born in the colony, and 673 British immigrants. Out of 1,093 foreigners, 980 were Norwegians and Swedes.

The people have until recently been mostly of Scottish descent, and almost entirely devoted to sheep-farming and dependent trades. Ship repairing and condemning at Port Stanley also forms locally an important item of profitable industry. These thrifty people have entirely replaced the early South American settlers and guachos, and with them have vanished the wild cattle and horses, which were less profitable than sheep.

Government.

The government of the colony is vested in a governor, aided by an executive council of four members, and a legislative council appointed by the Crown.

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CHAPTER XVI

DEFENCE OF AMERICAN TERRITORIES

Canada

Problems of Canadian defence.

THE questions involved in the participation of the Dominions in Imperial Defence are fully discussed in Vol. VI, Chapter V, and in this chapter it is proposed to consider only questions of local defence. Before doing so it is desirable to draw attention to the relative importance of these two aspects of the question of defence as applied to Canada, and to the difference of opinion that exists with reference to naval policy amongst Canadian politicians. There are only two possible enemies that could attack Canadian territory—the United States and Japan. In Vol. VI it is pointed out that the possibility of war between the British Empire and the United States is not a contingency which has much influence on our defensive arrangements. Japan is our ally, till the year 1921 at any rate. Local defence questions are, therefore, certainly not acute in Canada, as is amply proved by the debates on Mr. Borden's Navy Bill. If they were, no Canadian Premier could propose to offer a sum of £7,000,000 as a contribution to the Imperial Navy. It is true that Sir Wilfrid Laurier is opposed to Mr. Borden's naval policy, and that he advocates the formation of a Canadian Navy in both the Pacific and the Atlantic, the ships to be built in Canadian yards by Canadian labour. But he has never pleaded the urgency of local defence questions as an argument for strengthening Canadian naval and military forces, as opposed to the policy of contributions. While, therefore, the rival parties in Canadian politics differ on the question of the emergency that is said by Mr. Borden to exist as regards imperial defence, and the interest of Canada in this question, both parties seem to be agreed that Canadian local defence is not an urgent matter.

Admitting this, Canada maintains military forces which, by their organization and conditions of service, are unsuited for any other purpose than local defence. It is clear, therefore, that although there are no urgent questions arising as to the defence of Canada, and although she is perhaps less likely to be attacked than any other portion of the Empire, still her Government does not consider it politic to ignore the question of defence altogether.

That being the case, it is reasonable to consider here the elements of the military problems that would arise were she to be attacked, however unlikely such an attack may be.

Relations with Japan.

Attack by Japan may be dismissed in a few words. In all probability in such a contingency the United States would be our ally and the attack would have to come from oversea in the face of certain ultimate naval superiority. Although Japan could conceivably establish sufficient temporary naval superiority in the Pacific to enable her to attack the Western coast of Canada, it is not conceivable that she could maintain such superiority for long unless the British and American navies were fully occupied elsewhere. The attack could not, therefore, be formidable, and it is not worth while to consider possible developments in detail.

Relations with the United States.

The case of war with the United States is different, and it is proposed now to consider the purely strategical problems involved in such a war.

Neither Canada nor the United States maintains military forces of any considerable strength that can take the field on the outbreak of hostilities, but the resources of the United States are so greatly superior to those of Canada that, if no other factor were introduced, the initiative must necessarily rest with the United States. The only factor that could modify this conclusion would be the possibility of rapid reinforcement from oversea. It is not possible to make an accurate forecast of the time that must elapse before the British Navy could establish sufficient command of the Atlantic to move military reinforcements to Canada, but the work of destroying or immobilizing the American Navy would not be that of a day, and would necessitate the accumulation of naval resources on that side of the Atlantic. It would not be reasonable, therefore, to assume that assistance from Great Britain could confer the initiative on Canada. If this is admitted it becomes necessary to examine the problem from the point of view of Canada's ability to resist attack.

Geographical considerations.

It is now necessary to study a map. The first point to strike the student of the geographical conditions is that the resources of Canada are to a very great extent concentrated in that portion of the country which lies east of the Great Lakes and along the banks of the St. Lawrence. This district consists of a comparatively long and narrow belt of settled country with a hinterland of forest. No withdrawal in a northerly direction is therefore possible.

From Quebec to Toronto is a distance of 450 miles. From Montreal to the head of Lake Champlain is only 35 miles. From Ottawa to Ogdensburg is only 50 miles. For 100 miles below Kingston the St. Lawrence divides Canadian territory from that of the United States. Montreal is the commercial centre of Canada and the most important objective of the enemy. Its exposed position and the difficulty of maintaining communication with the other important centres of Quebec, Ottawa, Kingston, and Toronto by routes that run parallel to the enemy's frontier and at no considerable distance from it, while one most important avenue of communication, namely, the St. Lawrence and its canals, actually forms a considerable section of the frontier itself, are apparent. The importance of Halifax, Nova Scotia, as a port of disembarkation for reinforcements from oversea and of maintaining railway communication between that port and Quebec is emphasized by the fact that the mouth of the St. Lawrence is closed by ice during the winter. The same applies in a minor degree to St. John, New Brunswick. It is not too much, therefore, to say that the defence of Canada is largely a question of the maintenance of communications, which are so exposed that their protection involves problems of the greatest difficulty.

The Great Lakes.

The next point of importance is the position of the Great Lakes. By a convention entered into between Great Britain and the United States, in 1817, the number of armed vessels that may be maintained upon the lakes is limited to one each on Lake Ontario and two each on the Upper Lakes. Owing to the vastly greater resources of the United States, as regards shipping, and the power of extemporizing armaments, it is certain that the maritime command of the lakes, with the possible exception of Ontario, would fall to the United States. The possibility of reconquering the command of the Lakes by means of naval reinforcements is doubtful, unless effect is given to the project of the Georgian Bay—Ottawa—Montreal Canal, for which surveys and estimates have been made. Till this project is carried out, to establish maritime command of the lakes, it would be necessary to keep open the navigation of the St. Lawrence and its canals below Kingston, to prevent the destruction of the Welland Canal between Lakes Ontario and Erie, and to maintain communication by the St. Clair River between Lakes Erie and Huron. A glance at the map will show the dispersion of force necessary to carry out the above.

If the maritime command of the lakes cannot be reconquered, American military expeditions can cross Lake Huron and land in Canadian territory in Georgian Bay. The enemy would, therefore, be able to advance simultaneously direct from New York State via Lake Champlain on Montreal, and from Georgian Bay on Ottawa, and, if successful in such a combined movement, would probably strangle the life of Canada at the heart.

To maintain communication with the West against the superior forces that might be expected to invade Manitoba would probably be out of the question.

The successful defence of Canada, therefore, appears to depend on her power to maintain communication along the line of the St. Lawrence, from Kingston to Quebec, and to defend Ottawa and Montreal until such time as reinforcements from oversea will permit of the assumption of the offensive in this or some other theatre.

Canadian naval policy.

At the Imperial Conference of 1909 it was suggested to the Canadian representatives that the Canadian Government should provide a certain number of cruisers and destroyers to be stationed on the Atlantic and Pacific coasts of Canada, and that the foundations of a Canadian Navy should be laid in this way. Pending the construction of new vessels, it was suggested that the Admiralty should provide two cruisers so that the training of personnel could be proceeded with. These suggestions were approved.

In 1910 Sir Wilfrid Laurier's proposals for the Canadian naval service led to considerable discussion in the Canadian Parliament and throughout the Dominion, which showed that opinion on the subject was very divided. The cruisers *Niobe* and *Rainbow* were purchased from the Imperial Government to act as training ships, and the services of some British naval officers were lent to the Canadian Government. A Naval Act authorizing the creation of a Canadian Navy was passed, the proposed programme including the construction of four cruisers and six destroyers.

The experience of three years, however, has demonstrated very conclusively that the personnel required for even a very minor local force is not forthcoming, either as regards officers or men, from the Canadian population under existing social conditions. Moreover, the local steel shipbuilding industry is as yet on so small and undeveloped a scale that the construction of the specified ships would be a slow and very unduly expensive process as compared with similar work in the mother country. The policy adopted by Sir Wilfrid Laurier has, therefore, not succeeded in practice. The training ships are laid up for want of crews, and the tenders for building the new vessels have never been accepted. On succeeding to the Canadian Premiership, therefore, after the defeat of Sir Wilfrid Laurier's party, Mr. Borden informed Parliament that the part to be played by Canada in the naval defence of the Empire would be reconsidered.

In 1912 Mr. Borden visited London and attended meetings of the Committee of Imperial Defence, as well as conferring with representatives of the Admiralty. As a result of this visit, His Majesty's Government, at the request of Mr. Borden, instructed the Admiralty to prepare a statement showing the present and the immediately prospective requirements for the naval defence of the Empire. Having considered the memorandum, which was forwarded to the Canadian Government by the Admiralty, Mr. Borden announced in the Canadian House of Commons his determination to ask Parliament to vote £7,000,000 for the immediate construction of three of the largest ships of war that science can build and money supply. He further announced his intention of placing the proposed ships at the disposal of the Imperial Government for the common defence of the Empire, to be controlled and maintained as part of the Royal Navy.

This policy was vehemently opposed in the Canadian House of Commons by Sir Wilfrid Laurier and his party. Mr. Borden's policy apparently was based on the conception of fostering Imperial Federation by the creation of a great Imperial Fleet controlled as a single fighting organization. As a corollary to this conception he looked forward to the time when the Dominions should have a voice in the control of Imperial foreign policy.

Sir Wilfrid Laurier opposed this idea, preferring that Canada should have no voice in the direction of Imperial foreign policy, and that she should reserve to herself the right to take part in a war or not, according as to whether she approves or not of the cause for which the war is waged. The logical conclusion from his political views is his advocacy of a Canadian Navy, primarily for the protection of Canadian interests, which could be placed at the disposal of the Imperial Government on the outbreak of war should the Canadian Parliament so decide.

Mr. Borden passed his Navy Bill through the Canadian House of Commons in May 1913, but it was thrown out by the Senate till such time as the policy has received the approval of the Canadian people at a general election.

In the meanwhile, Mr. Winston Churchill, who had frequently stated in Parliament that the proposed Canadian ships were not surplus to the 'whole world requirements' of Imperial Naval Defence, announced the Government's intention of accelerating the Admiralty building programme by laying down three battleships in 1913 instead of 1914. Mr. Borden stated that should he be successful later in passing his Naval Bill he would acquire the three battleships that he originally proposed from the Imperial Government.

Canadian land forces.

The Canadian military organization[1] consists of:

The Permanent Militia.
The Active Militia.
Police.
Rifle Clubs.
Cadet Corps.

The whole of the able-bodied male population between the ages of 18 and 60 years is liable for service in the Militia. Such men as are not serving compose the Militia Reserve. The Militia can only be called upon as an organized body to serve in the defence of Canada, but provision is made to allow individual militiamen to volunteer for service in any part of the Empire. There are, however, no units formed with this special object available to proceed overseas at short notice.

The Permanent Militia consists of:

Staff.
2 Squadrons of Cavalry.
1 Squadron of Mounted Rifles.
2 Batteries, Horse Artillery.
5 Companies, Garrison Artillery.
Engineers.
10 Companies of Infantry.
Army Service Corps.
Army Medical Corps.
Army Veterinary Corps.
Ordnance Corps.
Army Pay Corps.

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[1] The legal aspects of military service are considered in Chapter IX.

The strength in all is about 270 officers and 2,700 other ranks.

The proportion of officers is high on account of the staff and instructional duties that fall to their lot in connexion with the Active Militia. The majority of the officers are educated at the Royal Military College, Kingston, which was established in 1876 to give cadets a complete military education and to afford a practical and scientific training in civil engineering, surveying, and physics. The course is for three years and there is accommodation for 100 cadets. All first appointments to commissions in the Royal Canadian Artillery and Engineers, and every alternate commission in the permanent cavalry and infantry, are offered to graduates of the College. Seven commissions are offered to graduates annually in the Regular Army at home.

The Permanent Forces, as their name implies, train throughout the year, and complete annually the course of musketry laid down for the Regular Army at home. A school of musketry has been established near Ottawa, at which two courses are held annually on the lines of the courses of instruction at Hythe.

The Active Militia consists of :

Staffs.
31 Regiments of Mounted Troops.
10 Brigades of Field Artillery.
4 Regiments of Garrison Artillery.
2 Regiments of Heavy Artillery.
5 Field Companies
3 Field Troops of Engineers.
1 Wireless Detachment
44 Regiments of Infantry.
15 Companies of Army Service Corps.
21 Field Ambulances, &c., Army Medical Corps.
Signalling Corps.
Veterinary Corps.
Corps of Guides.

The total strength is approximately 3,850 officers and 44,500 other ranks. The regiments and corps are little more than cadres, the average strength of a regiment of infantry being about 250 men.

The Cavalry, Artillery, and Army Service Corps train annually for 16 days, other arms and departments for 12 days. A musketry course is carried out annually on the lines of the course laid down for the Territorial Force at home. Rural Corps do their training in camp. City Corps do theirs by means of drills at regimental head-quarters, each drill being of not less than two hours' duration. Courses of instruction are held throughout the year for officers and non-commissioned officers at permanent and provisional schools of instruction.

The Royal North-West Mounted Police[1] was raised in 1873 for the maintenance of law and order in the North-West Territories. The force, which is commanded by a Commissioner, whose head-quarters are at Regina, is organized in 12 divisions, the present strength being about 650 (all ranks). The term of engagement is five years, and the force is permanently employed and trained as cavalry.

There are in Canada about 430 Civilian Rifle Associations with 24,000 members. Every member in case of emergency becomes a member of the Militia.

There are, in addition, about 270 Cadet Corps, with an authorized establishment of 20,000 cadets, which will probably soon be considerably augmented. The cadets are divided into seniors (14 to 18 years of age) and juniors (12 to 14 years of age). The provincial governments of Nova Scotia, New Brunswick, and Ontario include compulsory drill and rifle shooting in the curriculum of colleges and schools under their control.

It will be seen from the above that no serious preparations are made in Canada to provide against the contingency of war with her formidable neighbour. Nor are any military forces maintained that are suitable for employment for the wider task of Imperial Defence. It would again be necessary to improvise such forces on the outbreak of war, as was the case in 1899. Mr. Borden's naval policy, however, shows the extent to which a large section of his countrymen appreciate the needs of Imperial Defence, and understand the principles on which it is based, and also the sacrifices they are prepared to make in the interests of the Empire.

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[1] More fully dealt with in Chapter IX.

The West Indies and the Panama Canal

Before considering the strategical effect of the opening of the Panama Canal on interests affecting the Empire, it is necessary first of all to appreciate the effect it will have on ocean trade routes. The only portion of the Empire outside the American continent that will be brought nearer to London or Liverpool than at present is New Zealand. For Australia and the ports in the Far East the route by the Suez Canal is considerably the shorter. Ocean trade routes to British ports will, therefore, only be shortened in the case of New Zealand and ports on the west coast of North, Central, and South America, and in the last-named case the Canal dues will probably cause the route via Cape Horn to be preferred for all ports south of Valparaiso. A considerable volume of trade from the East Indies, China, Japan, Australia, and New Zealand consigned in British bottoms to ports on the east coast of North, Central, and South America will no doubt use the Canal.

The above forms a very small proportion of the seaborne trade of the Empire (see Map, Fig. 1, in Vol. VI), and the country that will benefit most, both commercially and strategically, by the opening of the Canal will be the United States. The Canal is being constructed by the United States, will be under their control, and will be fortified and garrisoned by that country, to the interests of which those of the British Empire will occupy a subordinate position.

There are two aspects of the strategical questions involved in the opening of the Canal, which call for consideration :

(i) The position in the Caribbean Sea in the event of war with the United States.

(ii) The protection of our trade through the Canal in the event of war with some other Power.

As regards the first of these, it is not necessary to labour the point that the possibility of war with the United States is not a contingency which has much influence on our defensive arrangements. It is only proposed, as in other cases, to consider the purely strategical aspects of the question, but if such a contingency were by any chance to arise we must recognize that the Canal will probably be heavily fortified and strongly garrisoned. The task of attacking it with a view to its capture would involve costly siege operations which could not be carried out till we had obtained command of the Atlantic and the Caribbean Sea. The British interests involved, as shown above, hardly point to the Canal being a suitable objective for our principal operations, but if we do not attack it we must make up our minds to its remaining closed to our commerce throughout the war. As long, however, as it remains open to the commerce of the enemy his vessels using it form a vulnerable objective for our fleet.

A reference to a map of the Caribbean Sea shows that the island of Jamaica commands the Windward Passage and is nearer to the Yucatan Channel and the Mona and Anegada Passages than is Panama. Ships using the Canal bound for the Atlantic ports of the United States must use one or other of these passages unless they make a wide detour by the Windward Islands. The value of Jamaica as a base of operations against the commerce of the United States using the Canal is therefore apparent, but only if we have sufficient naval force at our disposal to establish command of the Caribbean Sea. The island of Jamaica is faced by the harbour of Santiago de Cuba. A superior fleet based on this port would deny to us the Windward Passage, bottle us into the Caribbean Sea, and render our position at Kingston, Jamaica, precarious. A first necessity of the situation, therefore, would be that Kingston, Jamaica, should be able adequately to fulfil the functions of a naval base for a fleet of sufficient strength for our purpose.

To appreciate the questions involved in the protection of our trade through the Canal in the event of war with any other Power it is necessary again to refer to the chart. Ships using the Canal, moving from the Pacific to the Atlantic, are, broadly speaking, bound for one of three destinations : (i) ports on the east coast of Mexico, the United States, or Canada; (ii) Europe; (iii) South Africa or the east coast of South America. In the first case vessels will use either the Yucatan Channel or the Windward Passage ; in the second case they will use either the Mona or the Anegada Passage, west or east of Puerto Rico ; and in the third case they will use one of the channels in the Windward Islands. The importance of our being in a position to prevent a potential enemy from dominating one or other of these passages is easy to recognize. Probably the best way to do so is to foster a good understanding with the United States and to support them in their application of the Monroe doctrine to the West Indian Islands. Our interests are best served by the maintenance of the status quo and the prevention of any other Power from establishing a new fortified harbour commanding any of the principal ocean routes.

In Jamaica we already have a suitable base for the protection of our commerce, and we are interested only to see that no possible enemy undermines our sea power in this part of the world.

GAZETTEER OF TOWNS

(*Note.*—The towns included in this list have been selected partly on a basis of population, but also, especially in the case of certain smaller towns, with reference to their importance in relation to the localities in which they are situated.

The figures for latitude and longitude are approximate. The figures for population are in accordance with the latest available census returns, and the increase or decrease per cent., which in some cases follows these figures, and those for the value of industrial products (which are for the year 1910) cover the period of the preceding decade. The titles of Canadian railways are indicated by initials. Alta.=Alberta ; B.C., British Columbia ; Man., Manitoba ; N.B., New Brunswick ; N.S., Nova Scotia ; Ont., Ontario ; Que., Quebec ; Sask., Saskatchewan.)

CANADA

Amherst, 45° 47′ N., 64° 17′ W., N.S., seaport, at the head of Cumberland Basin, an arm of the Bay of Fundy, 138 m. N. of Halifax, on the I.C.R., is the centre of a farming district, with coal-mines and large timber areas. Has engineering works, and woollen, worsted, and timber mills. Pop. 8,973, increase 80·77 per cent.

Barrie, 44° 23′ N., 79° 43′ W., Ont., on Lake Simcoe, 63 m. NW. of Toronto, on G.T.R., has woollen, flour, and shingle mills, and manufactures of carriages, tobacco, and leather. Favourite summer resort. Pop. 6,420, increase 7·92 per cent.

Belleville, 44° 8′ N., 77° 22′ W., Ont., port of entry, on the Bay of Quinté, Lake Ontario, 113 m. E. of Toronto, on the G.T.R., is an important dairy centre, and has foundries, flour-mills, canning factories, and manufactures of jam, pottery, and cement. Pop. 9,876, increase 8·32 per cent.

Berlin, 43° 28′ N., 80° 29′ W., Ont., 60 m. W. of Toronto, on the C.P.R., G.T.R., and C.N.R., is the centre of an excellent agricultural district. Industries include tanneries, furniture, shoes, sugar, and motor-car tyre works. Value of products £1,905,000, increase 180·15 per cent. Pop. 15,196, increase 55·9 per cent.

Brandon, 49° 50′ N., 99° 50′ W., Man., on the Assiniboine River, 132 m. W. of Winnipeg, on the C.P.R., C.N.R., and G.N.R., has grain elevators, flour-mills, stock-yards, breweries, and creameries ; Dominion Experimental Farm and Indian industrial school situated here. Pop. 13,839, increase 152·6 per cent.

Brantford, 43° 8′ N., 80° 15′ W., Ont., 58 m. SW. of Toronto, on G.T.R., C.P.R., and several other lines, has foundries, flour-mills, and important manufactures of agricultural implements, cement, leather, boots and shoes, motor-cars, and carriages. Value of products £3,260,000, increase 185·12 per cent. Pop. 23,132, increase 38·19 per cent.

Brockville, 44° 37′ N., 75° 46′ W., Ont., on the St. Lawrence River, 126 m. SW. of Montreal, on C.P.R., C.N.R., and G.T.R., has manufactures of agricultural implements, engines, motor boats, stoves, hardware, and carriages; exports large quantities of dairy produce. Pop. 9,374, increase 3·74 per cent.

Calgary, 51° 2′ N., 114° 2′ W., Alta., in the valley of the Bow River, a tributary of the South Saskatchewan, 860 m. W. of Winnipeg, on the C.P.R., C.N.R., and G.T.R., is the trade and railway centre of a large agricultural and stock-raising district, and chief supply centre of mining district in the Rocky Mts. and British Columbia. Industries include flour-mills, breakfast foods, factories, saw-mills, tanneries, meat-packing establishments, and large railway workshops of the C.P.R. Extensive coal beds, lime, brick clay, building stone, and natural gas in the neighbourhood. Value of products £1,590,000, increase 1,193·0 per cent. Seat of Anglican bishop. Pop. 43,704, increase 893·72 per cent.

Charlottetown, 46° 14′ N., 63° 10′ W., seaport and capital of Prince Edward Island, on Hillsborough Bay in Northumberland Strait, at the confluence of three rivers, has an excellent harbour. Industries include pork-packing, condensed milk, fishing, lobster-packing, saw-mills, and iron foundries. Seat of a Roman Catholic bishop. Pop. 11,203, decrease 7·17 per cent.

Chatham, 42° 24′ N., 82° 11′ W., Ont., on the river Thames, which is here navigable, 13 m. N. of Lake Erie, 180 m. SW. of Toronto, on the C.P.R., G.T.R., and other lines, is the centre of a good farming and fruit district. Industries include flour and woollen mills, fruit-canning, and the manufacture of wagons, carriages, and butter. Value of products £1,035,000, increase 85·03 per cent. Pop. 10,770, increase 18·77 per cent.

Chicoutimi, 48° 27′ N., 71° W., Que., on the Saguenay River, 227 m. NE. of Quebec, on C.N.R., has large timber and pulp mills, furniture and wooden-ware factories, tanneries, creameries and cheese factories, and foundries. Seat of Roman Catholic bishop. Pop. 5,880, increase 53·69 per cent.

Cobalt, 47° 50′ N., 79° 45′ W., Ont., on Cobalt Lake, 330 m. by rail N. of Toronto, is the centre of a district containing the richest silver ores in the world; the ores contain also cobalt, nickel, and arsenic. Pop. 5,638.

Cobourg, 43° 58′ N., 78° 9′ W., Ont., port of entry, on Lake Ontario, 69 m. ENE. of Toronto, on G.T.R. and C.P.R., has manufactures of steel rails, railway carriages, and woollen mills; favourite summer resort. Pop. 5,074, increase 19·7 per cent.

Collingwood, 44° 30′ N., 80° 13′ W., Ont., port of entry, on Georgian Bay, Lake Huron, 78 m. NW. of Toronto, on G.T.R., has timber mills, tanneries, foundries, meat-packing, nail and furniture factories, ship yards, and trade in grain and timber. Pop. 7,090, increase 23·19 per cent.

Cornwall, 45° 3′ N., 74° 43′ W., Ont., port of entry, on the St. Lawrence River, terminus of Cornwall Canal, 56 m. SE. of Ottawa, on the G.T.R. and other lines, has cotton, woollen, flour, paper, and saw mills, foundries, lacrosse factory, and manufactures of furniture, stoves, bedsteads, and clothing. Pop. 6,598, decrease 1·58 per cent.

Edmonton, 53° 33′ N., 113° 30′ W., capital of Alberta, on the North Saskatchewan River, 793 m. NW. of Winnipeg, on C.P.R., G.T.R., and C.N.R., is centre of an important coal area, 30 coal-mines being worked in or near the city, and of rich farming district. Industries include meat-packing, flour-mills, grain elevators, saw-mills, brick-yards, foundries, and brewing. Seat of University of Alberta and of Roman Catholic seminary. Pop. 24,900, increase 848 per cent. In 1912 it had 53,383 inhabitants, including Strathcona situated on the opposite side of the river, which has been incorporated with it.

Fort William, 48° 23′ N., 89° 20′ W., Ont., port of entry at the head of navigation on Lake Superior, 426 m. by rail ESE. of Winnipeg, on C.P.R., G.T.R., and C.N.R., has large transhipment trade, being the gateway to the wheatfields of Western Canada. Has large elevators, flour and timber mills, iron foundries, brick and cement works, and shipbuilding; large blast furnaces, and silver and copper mines in the neighbourhood. Pop. 16,499, increase 354 per cent.

Fraserville (Rivière du Loup), 47° 52′ N., 69° 35′ W., Que., picturesquely situated at the confluence of the Rivière du Loup with the St. Lawrence, 118 m. NE. of Quebec, on the I.C.R., is a favourite summer resort, with good fishing and caribou shooting in the neighbourhood. Industries include grist-mills, pulp-mills, butter factories, and railway workshops. Pop. 6,774, increase 48·26 per cent.

Fredericton, 45° 57′ N., 66° 36′ W., capital of New Brunswick, on St. John River, 54 m. NW. of St. John, on C.P.R. and I.C.R., has timber mills, foundries, and manufactures of canoes, motor boats, leather, and boots and shoes. Seat of university, and of Anglican bishop. Pop. 7,208, increase 1·28 per cent.

Galt, 43° 23′ N., 80° 20′ W., Ont., 60 m. WSW. of Toronto, on C.P.R. and G.T.R., is the centre of an agricultural district, with supplies of timber, limestone, and sand. Manufactures include agricultural implements, brass goods, engines and boilers, carriages, and leather. Value of products £1,079,000, increase 136·0 per cent. Pop. 10,299, increase 30 93 per cent.

Glace Bay, 46° 12′ N., 59° 58′ W., N.S., seaport, on bay of same name, is an important coal-mining centre; industries also include machine works, wood-working factories, and fishing. Pop. 16,562, increase 138·47 per cent.

Guelph, 43° 33′ N., 80° 16′ W., Ont., 48 m. W. of Toronto, on C.P.R., G.T.R., and C.N.R., is the centre of one of the finest agricultural districts in the province; seat of famous Agricultural College and experimental farm attached to it. Manufactures include agricultural implements, malleable iron, rubber, wagons and carriages, pianos, organs, sewing machines, cotton and woollen goods, clothing, and breweries. Value of products £1,520,000, increase 100·37 per cent. Pop. 15,175, increase 32·0 per cent.

Halifax, 44° 39′ N., 63° 36′ W., seaport and capital of Nova Scotia, picturesquely situated on a peninsula enclosed by a magnificent harbour, which is open all the winter; Atlantic terminus of I.C.R., with excellent harbour facilities. Industries include iron foundries, sugar refineries, brewing, distilling, and the manufacture of machinery, agricultural implements, paper, cotton and woollen goods, tobacco, and musical instruments. Value of products £2,495,000, increase 75·25 per cent. Seat of Anglican bishop and Roman Catholic archbishop. Pop. 46,619, increase 14·17 per cent.

Hamilton, 43° 16′ N., 79° 55′ W., Ont., situated at the western extremity of Lake Ontario, 39 m. SW. of Toronto, on the C.P.R., G.T.R., and other lines, has important industries of steel, iron, agricultural implements, electrical wires and cables, cotton and woollen goods, boots, and furniture. Value of products £11,330,000, increase 221·95 per cent. Seat of Anglican and Roman Catholic bishops. Pop. 81,969, increase 55·73 per cent.

Hull, 45° 27′ N., 75° 43′ W., Que., situated on north bank of Ottawa River, opposite Ottawa, on the C.P.R., has planing mills, pork-packing works, and manufactures of pulp, wooden wares, furniture, and cement. Value of products £1,492,000, increase 128·13 per cent. Pop. 18,322, increase 30·22 per cent.

Joliette, 46° 4′ N., 73° 30′ W., Que., on the Assomption River, 36 m. NE. of Montreal, on C.P.R., has saw and paper mills, and manufactures of tobacco, steel, iron, chemicals, and woollen goods. Seat of Roman Catholic bishop. Pop. 6,346, increase 50·38 per cent.

Kenora, 49° 50′ N., 94° 40′ W., Ont., situated on the Lake-of-the-Woods, where its waters issue into the Winnipeg River, 133 m. E. of Winnipeg, on C.P.R., is a summer and tourist resort, and has timber and flour mills, grain elevators, and boat-building industry. Pop. 6,158, increase 18·58 per cent.

Kingston, 44° 15′ N., 76° 35′ W., Ont., port of entry situated at the point where the St. Lawrence River leaves Lake Ontario, 185 m. E. of Toronto, on G.T.R., has foundries, boat-building, flour and cotton mills, cereal foods, factories, and breweries. Seat of Anglican and Roman Catholic bishops, of a university, and of a military college. Pop. 18,874, increase 5 per cent.

Lachine, 45° 28′ N., 73° 40′ W., Que., port of entry situated on Lake St. Louis, part of the St. Lawrence River, 8 m. SW. of Montreal, with which it is connected by a canal, 9 miles long, through which all the water-borne commerce between that city and the west passes, in order to avoid the famous Lachine Rapids on the St. Lawrence. Served by the C.P.R. and G.T.R. Industries include large electric power plants, steel and iron works, boat-building, and manufactures of wire, carriages, wooden wares, and pickles. Value of products £1,294,000, increase 116·36 per cent. Pop. 10,699, increase 92·21 per cent.

Lethbridge, 49° 48′ N., 112° 42′ W., Alta., on the Belly River, 144 m. SE. of Calgary, on the C.P.R. and G.N.R., is the centre of an important coal-mining district and the trading centre of a large agricultural district; has grain elevators and flour-mills; Dominion Government Experimental Farm situated here. Pop. 8,050, increase 288·5 per cent.

Levis, 46° 49′ N., 71° 12′ W., Que., situated on the St. Lawrence River, opposite Quebec, on the G.T.R. and I.C.R., has tanneries, shipyards, sawmills, and manufactures of boots and shoes and tobacco. Pop. 7,452, decrease 4·25 per cent.

London, 43° 1′ N., 81° 17′ W., Ont., on the river Thames, 115 m. SW. of Toronto, on C.P.R., G.T.R., and other lines, is centre of a very rich farming district. Manufactures include iron and brass works, tinware, agricultural implements, furniture, chemicals, petroleum refining, and breweries. Value of products £3,344,000, increase 100·36 per cent. Seat of university, and of Anglican and Roman Catholic bishops. Pop. 46,300, increase 21·92 per cent.

Maisonneuve, 45° 40′ N., 73° 40′ W., Que., situated on the St. Lawrence River, a few miles NW. of Montreal, may be considered as an industrial suburb of Montreal, where many industries similar to those of Montreal (q. v.) are carried on. Value of products £4,275,000; increase 246·39 per cent. Pop. 16,684, increase 372 per cent.

Medicine Hat, 50° 8′ N., 110° 30′ W., Alta., on the South Saskatchewan River, 660 m. W. of Winnipeg, on the C.P.R., has grain elevators, foundries, flour, steel, and iron mills, and manufactures of pencils, glass, and clay products; coal, good clay, and natural gas in the neighbourhood. Pop. 5,608, increase 257 per cent.

Moncton, 46° 5′ N., 64° 48′ W., N.B., port situated at the head of navigation of the Petitcodiac River, which flows in the Bay of Fundy, 89 m. NE. of St. John, is the Atlantic terminus of Grand Trunk Pacific Railway, and also the head-quarters of the Intercolonial Railway. Industries include the workshops of the Intercolonial Railway, and manufactures of cotton, wire flour, and wooden wares; oil and natural gas in the neighbourhood. Pop. 11,345, increase 25·7 per cent.

Montreal, 45° 30′ N., 73° 35′ W., Que., the principal port of entry and the first commercial and industrial city of Canada, is situated on the south-eastern side of the island of Montreal, at the junction of the Ottawa and St. Lawrence rivers. It stands at the head of sea-going navigation, nearly 1,000 m. inland, and at the foot of the extensive system of rivers, lakes, and canals which carry commerce between the interior of Canada and the Atlantic seaboard. The harbour, one of the finest in the world, offers extensive accommodation with over 7 m. of deep water wharfage, which permits the passage of vessels drawing 30 ft. at low water, and is provided with all modern facilities. About one-third of the total imports and exports of Canada passes through it, the leading articles among exports being grain and dairy produce. It is the head-quarters of the C.P.R. and G.T.R., and is also on the C.N.R., the I.C.R., and several other lines. Principal industries include sugar refineries, iron works of all kinds, machinery, railway carriages, sewing machines, cotton and woollen goods, silk, clothing, rubber, meat-packing, flour-mills, and breweries. Value of products £34,200,000, increase 133·89 per cent. It is the seat of McGill University and of a branch of the University of Laval (see Quebec), and of Anglican and Roman Catholic bishops. Pop. 470,480, increase 75·73 per cent.; birth-rate (1906–10) 37·1 per thousand, death-rate 22·6 per thousand.

Moosejaw, 50° 20′ N., 105° 35′ W., Sask., situated at the junction of Moosejaw and Thunder Creek Rivers, 308 m. W. of Winnipeg, on the C.P.R. and C.N.R., has flour and oatmeal mills, stock-yards, steel works, woodenware manufactures and tanneries; coal and clay in the neighbourhood. Pop. 13,823, increase 787·23 per cent.

Nanaimo, 49° 10′ N., 124° W., B.C., seaport, situated on the east coast of Vancouver Island, on a fine natural harbour, 35 m. by sea W. of Vancouver, is an important coal-mining town; has saw-mills and large fishing and curing establishments; large exports of salted herring to the Far East; copper in the neighbourhood. Pop. 8,306, increase 35·5 per cent.

Nelson, 49° 29′ N., 117° 21′ W., B.C., situated at termination of navigation on western arm of Kootenay Lake, on C.P.R. and G.N.R., is centre of fruit and mining district, and also favourite tourist resort. Has iron works, boat-building, and jam factories. Pop. 4,476, decrease 17 per cent.

New Glasgow, 45° 41′ N., 62° 39′ W., N.S., on the I.C.R., 8 m. by rail SE. of Pictou Landing on Northumberland Strait; is the centre of a district rich in coal, iron ore, and limestone, and has large steel works, glass works, and timber mills. Pop. 6,383, increase 43·5 per cent.

New Westminster, 49° 13′ N., 122° 54′ W., B.C., situated on the Fraser River, 13 m. from the Pacific Ocean, 12 m. ESE. of Vancouver, on the C.P.R., G.N.R., and C.N.R., is the only freshwater port of western Canada, one of the oldest settlements in the province, and the seat of an Anglican bishop. Industries include fishing, salmon canning, dairying, saw and paper mills, boiler works, shipyards and railway workshops. Pop. 13,199, increase 103 per cent.

Niagara Falls, 43° 12′ N., 79° 9′ W., Ont., situated on the west bank of the Niagara River, below the falls, opposite the city of the same name in the United States, 82 m. S. of Toronto, on the C.P.R., C.N.R., G.T.R., and several other lines, being the junction of lines from the United States with the Canadian trunk lines. Has extensive hydro-electric works for generating power, and its manufactures include cereal foods, carborundum, graphite, aluminium wares, chemicals, creameries, and iron foundries. Pop. 9,248, increase 62 per cent.

Orillia, 44° 35′ N., 79° 25′ W., Ont., situated on Lake Conchiching, on G.T.R., C.P.R., and C.N.R., is the centre of a fruit and farming district, and also a favourite tourist resort. Has foundries, flour, woollen, and pulp mills, and manufactures of carriages, furniture, and motor-cars. Pop. 6,828, increase 39·15 per cent.

Oshawa, 43° 52′ N., 78° 56′ W., Ont., port of entry on Lake Ontario, 35 m. NE. of Toronto, on G.T.R., C.N.R., and C.P.R., is the centre of a fruit and farming district, producing sugar beetroot of good quality. Has flour-mills, canning factories, foundries, tanneries, and a piano factory. Pop. 7,436, increase 69·46 per cent.

Ottawa, 45° 26′ N., 75° 40′ W., Ont., capital of the Dominion of Canada, one of the finest cities on the American continent, picturesquely situated on the Ottawa River, on the C.P.R., G.T.R., and C.N.R. It contains amongst other educational establishments a university (Roman Catholic), astronomical observatory, and an experimental farm; seat of Anglican and Roman Catholic archbishops. Industries include iron works and foundries, timber, paper, and flour mills, and manufactures of agricultural implements, carbide, marine gas-buoys, clothing, bricks, and cement; centre of large timber trade. Value of products £4,300,000, increase 173·92 per cent. Pop. 87,062, increase 45·27 per cent.

Owen Sound, 44° 33′ N., 81° 4′ W., Ont., situated at mouth of Sydenham River, on Georgian Bay, 122 m. NW. of Toronto, on C.P.R. and G.T.R., has one of the best harbours on Lake Huron. Industries include flour and saw mills, foundries, tanneries, manufactures of cement, agricultural implements, and furniture, grain elevators, and cold storage plants. Pop. 12,558, increase 43·95 per cent.

Peterborough, 44° 17′ N., 78° 19′ W., Ont., situated on the Otonabee River, which descends here 150 ft. within a few miles and affords motive power for numerous mills, 70 m. NE. of Toronto, on the C.P.R. and G.T.R., and the Trent Canal, is the trade centre of a flourishing agricultural district. Industries include timber and flour mills, manufactures of electric machinery and supplies, cereal foods, agricultural implements, sails, and carpets, pork-packing, and canoe factories. Value of products £2,180,000, increase 180·62 per cent. Seat of a Roman Catholic bishop. Pop. 18,360, increase 63·36 per cent.

Portage La Prairie, 49° 58′ N., 98° 17′ W., Man., 56 m. W. of Winnipeg, an important railway junction, situated on the C.P.R., C.N.R., G.T.R., and G.N.R., is an important centre of the grain trade. Has grain elevators, flour and oatmeal mills, and manufactures of farm implements, radiators and steam-heating supplies, and bricks, and timber yards. Pop. 5,892, increase 51 per cent.

Port Arthur, 48° 23′ N., 89° 15′ W., Ont., port of entry, at the head of navigation on Lake Superior, is situated almost half-way across Canada, being 1,700 m. from the Atlantic coast, and 1,900 m. from the Pacific coast, 424 m. ESE. of Winnipeg, on the C.P.R., C.N.R., G.T.R., and other lines, 4 m. NE. of its sister port, Fort William. Is the centre of a rich agricultural district, which contains also extensive beds of iron ore and numerous waterfalls. Has large grain elevators, blast furnaces, shipbuilding and railway workshops. Pop. 11,220, increase 249 per cent.

Prince Albert, 53° 8′ N., 106° 5′ W., Sask., on North Saskatchewan River, 250 m. NNW. of Regina, on C.N.R., G.T.R., and C.P.R., is the centre of an extensive forest region extending northward for about 2,000 sq. m. Has saw and planing mills, flour-mills, boat-building and brick plants. Seat of Roman Catholic bishop. Pop. 6,254, increase 250·36 per cent.

Prince Rupert, 54° 20′ N., 130° 25′ W., B.C., seaport situated on the Tsimpsean Peninsula, 550 m. NW. of Vancouver, is the western terminus of the Grand Trunk Pacific Railway, and has an excellent non-tidal harbour. Seat of an Anglican bishop. Pop. 4,184.

Quebec, 46° 48′ N., 71° 13′ W., port of entry and capital of Quebec, perhaps the most picturesque city in America, situated on the steep north bank of the St. Lawrence, at its junction with St. Charles River, 180 m. NE. of Montreal. It has a spacious harbour, one of the best in America, closed during winter (middle December–middle April), and is on C.P.R., G.T.R., C.N.R., and several other lines. Principal industries include saw-mills, tanneries, and manufactures of furniture, boots and shoes, cotton goods, tobacco, and biscuits; large exports of timber, furniture, and grain. Value of products £3,525,000, increase 34·19 per cent. Seat of the French University of Laval, and of an Anglican bishop and of Roman Catholic archbishop. Pop. 78,710, increase 13·58 per cent.

Regina, 50° 27′ N., 104° 37′ W., capital of Saskatchewan, 358 m. WNW. of Winnipeg, on C.P.R. and C.N.R., is the principal distributing point in the middle west, and the centre of a rich agricultural district. Industries include flour-mills, stock-yards, tanning, foundries, and grain elevators. Seat of Anglican and Roman Catholic bishops. Pop. 30,213, increase 1,243·4 per cent.

St. Boniface, 49° 50′ N., 97° 6′ W., Man., situated on the Red River, opposite Winnipeg, great railway junction; has large grain elevators, timber, flour, and linseed oil mills, stock-yards, and breweries. Seat of Roman Catholic archbishop. Pop. 7,483, increase 270 per cent.

St. Catharines, 43° 11′ N., 79° 14′ W., Ont., 71 m. SSE. of Toronto, on the G.T.R. and the Welland Canal, is the centre of the fruit belt of Ontario. Industries include paper, planing and flour mills, biscuit-making, fruit-canning, and agricultural implement works. Value of products £1,237,000, increase 190·95 per cent. Has saline springs, efficacious against rheumatism, gout, and skin diseases. Pop. 12,484, increase 24·51 per cent.

St. Hyacinthe, 45° 35′ N., 72° 59′ W., Que., 36 m. E. of Montreal, on the C.P.R., G.T.R., and I.C.R., has manufactures of agricultural implements, leather, organs, boots and shoes, wooden wares, corsets, and woollen goods. Seat of Roman Catholic bishop, and of a seminary. Pop. 9,797, increase 5·72 per cent.

St. John, 45° 14′ N., 66° 3′ W., N.B., seaport on the Bay of Fundy, at the mouth of St. John River, terminus of C.P.R. and I.C.R., is open all the year round, and disputes with Halifax the position of the first winter port of Canada. Industries include timber, cotton, paper, and flour mills, shipbuilding, steel, iron, engine and boiler works, tanneries, fish-curing, and manufactures of nails, brushes, and soap. Value of products £2,072,000, increase 50·19 per cent. Seat of Roman Catholic bishop. Pop. 42,511, increase 4·42 per cent.

St. Thomas, 42° 29′ N., 81° 16′ W., Ont., 130 m. SSW. of Toronto, on G.T.R., C.P.R., and other lines, is centre of a rich agricultural and fruit belt. Industries include railway workshops, planing and flour mills, iron, steel, and brass works, and manufactures of biscuits and shoes. Pop. 14,054, increase 22·37 per cent.

Sarnia, 42° 57′ N., 82° 35′ W., Ont., at the mouth of St. Clair River, on Lake Huron, 170 m. SW. of Toronto, on G.T.R., is centre of a district supplying salt, timber, and petroleum. Industries include saw-mills, oil refineries, salt works, and manufactures of carriages, lubricants, and furniture. Pop. 9,947, increase 9·41 per cent.

Saskatoon, 52° 10′ N., 106° 50′ W., Sask., on South Saskatchewan River, 466 m. WNW. of Winnipeg, on the C.P.R., C.N.R., and G.T.P.R., a fast-growing centre of a rich agricultural district; has saw and flour mills, wooden-ware factories, and foundries. Seat of a university, agricultural college, and experimental farm. Pop. 12,004 (in 1901, 113).

Sault Ste Marie, 46° 30′ N., 84° 23′ W., Ont., on the St. Mary's River, which connects Lakes Huron and Superior, 397 m. NW. of Toronto, on C.P.R.; has large iron, steel, paper, and saw mills. Seat of Anglican and Roman Catholic bishops. Pop. 10,984, increase 53·22 per cent.

Sherbrooke, 45° 25′ N., 71° 57′ W., Que., situated at the confluence of Magog and St. Francis Rivers, 101 m. ESE. of Montreal, on the C.P.R., G.T.R., and other lines, is centre of a district containing asbestos and copper mines and pulp-mills. It has also manufactures of machinery, woollen goods, carpets, wooden wares, and grist-mills. Seat of Roman Catholic bishop. Pop. 16,405, increase 39·44 per cent.

Sorel, 46° 2′ N., 73° 10′ W., Que., situated on Richelieu River at its mouth in Lake St. Peter, St. Lawrence River, 45 m. NE. of Montreal, on the C.P.R., has saw-mills, shipbuilding, agricultural implement works, foundries, and wooden-ware factories. Pop. 8,420, increase 19·31 per cent.

Stratford, 43° 24′ N., 81° W., Ont., important railway junction, 88 m. SSW. of Toronto, on the G.T.R., is trade centre of large agricultural district, with manufactures of agricultural implements, flour, biscuits, dairy supplies, furniture, pork-packing, and railway workshops. Value of products £1,056,000, increase 165·29 per cent. Pop. 12,946, increase 29·99 per cent.

Sudbury, 46° 40′ N., 81° W., Ont., situated 312 m. WNW. of Ottawa, on the C.P.R., is the centre of a district possessing rich deposits of nickeliferous pyrrhotite, the ore containing, besides nickel, cobalt, copper, and platinum. There are smelting works and timber mills. Pop. 4,150, increase 106 per cent.

Sydney, 46° 8′ N., 60° 10′ W., N.S., seaport, situated on Sydney Harbour, one of the best on the Atlantic coast, on the I.C.R., is the centre of a district rich in coal, iron, copper, marble, limestone, and timber, and has large steel plants, manufactures of machinery, stoves, chemicals, cement and bricks, and marble works. Value of products £1,930,000, increase 1,387·97 per cent. Pop. 17,723, increase 78·76 per cent. Sydney Mines (pop. 7,470) lies 3 m. W., and North Sydney (5,418), a coal-shipping port, 5 m. N.

Thetford Mines, 46° 5′ N., 71° 20′ W., Que., 76 m. SSW. of Quebec, on Quebec Central Railway, has asbestos and chrome-iron mines. Pop. 7,261, increase 123 per cent.

Toronto, 43° 40′ N., 79° 24′ W., capital of Ontario, situated on the north shore of Lake Ontario, on a spacious inlet called the Bay of Toronto, forming a commodious harbour, 333 m. SW. of Montreal, on the C.P.R., G.T.R., and C.N.R. Toronto is the second commercial and industrial city of the Dominion, its industries including agricultural implement works, iron foundries, flour-mills, wood products, leather, brewing and distilling, shipbuilding, and piano works; largest publishing centre. Value of products

£31,700,000, increase 164·15 per cent. Chief exports, timber, grain, heating appliances, and agricultural implements. Seat of a university and of Anglican and Roman Catholic bishops. Pop. 376,538, increase 80·99 per cent.; birth-rate (1906–10) 30·8 per thousand, death-rate 18·2 per thousand.

Trois Rivières (Three Rivers), 46° 20′ N., 72° 34′ W., Que., port of entry, situated at the junction of St. Maurice and St. Lawrence rivers, half-way (98 m.) between Quebec and Montreal, on C.P.R. and G.T.R., with a fine harbour, available for steamers drawing 30 ft. Industries include timber, pulp and cotton mills, foundries, tanneries, and manufactures of wooden wares, boots and shoes, and stoves. Seat of Roman Catholic bishop. Pop. 13,691, increase 37·17 per cent.

Truro, 45° 21′ N., 63° 18′ W., N.S., situated 2 m. from the head of Cobequid Bay, the easternmost arm of the Bay of Fundy, 62 m. NNE. of Halifax, on the I.C.R., is an important railway junction and centre of an agricultural district. Has manufactures of condensed milk, hats, woollen goods, and machinery; educational centre. Pop. 6,107, increase 1·9 per cent.

Valleyfield, 45° 14′ N., 74° 6′ W., Que., port of entry, on the St. Lawrence River, 30 m. SW. of Montreal, on the G.T.R. and other lines, is the centre of a district supplying timber, iron ore, and limestone. Industries include cotton, flour, timber, and paper mills, biscuit works, and foundries. Seat of Roman Catholic bishop. Pop. 9,449, decrease 14·53 per cent.

Vancouver, 49° 17′ N., 123° 5′ W., B.C., seaport and the largest city of the province, situated on Burrard Inlet, has one of the best deep-water harbours on the Pacific coast, and is the western terminus of the C.P.R., C.N.R., and G.N.R., and of several other railways. Industries include shipbuilding, railway workshops, foundries, steel works, flour and timber mills, salmon and halibut canneries, sugar refineries, and furniture factories; value of products £3,097,000, increase 202·3 per cent. Seat of Roman Catholic archbishop. Pop. 100,401, increase 271·7 per cent.

Victoria, 48° 24′ N., 123° 19′ W., seaport and capital of British Columbia, situated on south-eastern coast of Vancouver Island, 80 m. SW. of Vancouver, has the appearance of an English town, and is famous for its beauty and its equable climate. Has a university and is the seat of Anglican and Roman Catholic bishops. Is the head-quarters of the Canadian fur-sealing fleet, and its industries include fish-canning, shipbuilding, saw-mills, and furniture factories; coal, iron, and copper in the neighbourhood. Pop. 31,660, increase 51·35 per cent. Three miles north-west of Victoria is Esquimalt, a fine land-locked harbour, formerly only a naval harbour, but now open to merchant vessels.

Welland, 42° 59′ N., 79° 17′ W., Ont., situated on the Welland Canal, 82 m. S. of Toronto, on G.T.R. and other lines, has foundries, steel works, flour-mills, and manufactures of motor-cars, agricultural implements, stoves, brass and iron beds, and rope. Pop. 5,318, increase 184·91 per cent.

Windsor, 42° 20′ N., 83° W., Ont., port of entry, situated on Detroit River, near its entrance into Lake St. Clair, in waterway communication with the Great Lakes, 228 m. SW. of Toronto, on the C.P.R., G.T.R., and other lines, has large salt works, foundries, manufactures of chemicals, machinery, furniture, stoves, cereal foods and motor-cars, and saw-mills; salt and limestone in the neighbourhood. Pop. 17,829, increase 46·7 per cent.

Winnipeg, 49° 53′ N., 97° 7′ W., capital of Manitoba, situated at the junction of the Assiniboine with the Red River, occupies a commanding position which makes it the gateway to the west. It is a great railway junction, transcontinental railways and 14 branch lines radiating from it, and through the Red River it has water communication with Lake Winnipeg. It is the largest grain market in the British Empire, and a great wholesale and distributing centre. All the railways have here large workshops, and among other industries are agricultural implement works, iron, steel, and wire works, timber and flour mills, meat-packing establishments, and manufactures of breakfast foods, furniture, wooden wares, jewellery, and harness. Value of products £7,220,000, increase 279·45 per cent. Is the seat of the University of Manitoba, and of an Anglican archbishop. Pop. 136,035, having more than trebled since 1901.

Woodstock, 43° 9′ N., 80° 46′ W., Ont., railway junction, 88 m. SW. of Toronto, on G.T.R. and C.P.R., is the centre of a rich agricultural district with good supplies of grain, wool, and hides. Has manufactures of agricultural implements, pianos, machinery, and wagons, and flour and timber mills. Pop. 9,320, increase 5·51 per cent.

Yarmouth, 43° 49′ N., 66° 6′ W., N.S., seaport, situated at the south-western extremity of Nova Scotia, 248 m. SSW. of Halifax, on C.P.R., is the gateway of Nova Scotia from the United States. Has large exports of timber, and its industries include shipbuilding, lobster-canning, and fishing; favourite summer resort. Pop. 6,600, increase 2·64 per cent.

NEWFOUNDLAND

Harbor Grace, 47° 41′ N., 53° 12′ W., seaport, on the W. side of Conception Bay, 26 m. by rail WNW. of St. John's, has nearly one-fourth of the trade of the colony. Seat of a Roman Catholic bishop. Pop. 4,279.

St. John's, 47° 33′ N., 52° 45′ W., seaport and capital, on the east side of the peninsula of Avalon, is the most easterly port of America, being only 2,300 m. from Liverpool. Its land-locked harbour, one of the best on the Atlantic coast, is accessible to the largest steamers at all tides. It is the centre of the cod, seal, and whale fisheries of the island, and its principal trade and industries are connected with fishing. Seat of a Roman Catholic archbishop and of an Anglican bishop. Pop. 32,292.

WEST INDIES, ETC.

Belize, 17° 29′ N., 88° 20′ W., chief seaport and capital of British Honduras, situated at the mouth of the Belize River, with an open roadstead but no harbour, on account of sand-bars, is the chief centre of the mahogany trade. Seat of Anglican and Roman Catholic bishops. Pop. 10,478.

Bridgetown, 13° 8′ N., 59° 33′ W., seaport and capital of Barbados, on the west coast, along the north-east shore of Carlisle Bay, has a spacious and safe roadstead but no harbour. Seat of Anglican bishop. Pop. 16,648.

Georgetown, 6° 29′ N., 58° 11′ W., seaport and capital of British Guiana, at the mouth of the Demerara River, has a large export in timber, sugar, coffee, and cocoa. Seat of Anglican and Roman Catholic bishops. Pop. 54,000.

Hamilton, 32° 15′ N., 64° 50′ W., capital of the Bermuda Islands, is situated on the island of Great Bermuda, or Main Island, in the inner part of the Great Sound. Pop. 2,624.

Kingston, 17° 55′ N., 76° 40′ W., capital and chief seaport of Jamaica, situated on the south-eastern coast of the island, with a fine land-locked harbour, has a dry and healthy climate, and is famous for its beautiful suburbs. Seat of an Anglican bishop. Pop. 57,379.

Port of Spain, 10° 38′ N., 61° 26′ W., seaport and capital of Trinidad, on the north-western coast of the island, facing the Gulf of Paria, has a fine harbour and is the chief distributing and shipping centre between the valley of the Orinoco, in Venezuela, and Europe. Considered one of the finest towns in the West Indies; seat of a Roman Catholic archbishop and of an Anglican bishop. Pop. 60,000.

Spanish Town, 18° 3′ N., 77° W., Jamaica, 12 m. by rail W. of Kingston, on the Cobre River, was until 1871 the capital of Jamaica. Pop. 7,119.

STATISTICS

By Harold Macfarlane

CANADA

LAND AND WATER AREAS

	Total area sq. m.	*Relation to area of United Kingdom.*	*Land area sq. m.*	*Water area sq. m.*
Alberta	255,285	2·1 :	252,925	2,360
British Columbia	355,855	2·93 :	353,416	2,439
Manitoba	251,832	2·098 :	231,926	19,906
New Brunswick	27,985	0·23 :	27,911	74
Nova Scotia	21,428	0·176 :	21,068	360
Ontario	407,262	3·014 :	365,880	41,382
Prince Edward I.	2,184	0·018 :	2,184	—
Quebec	706,834	5·822 :	690,865	15,969
Saskatchewan	251,700	2·079 :	243,382	8,318
Yukon	207,076	1·76 :	206,427	649
N.W. Territories	1,242,224	10·23 :	1,207,926	34,298
Total Canada	3,729,665	30·8 : 1	3,603,910	125,755

FORESTRY

The total forest area of Canada is said to be 835,000 square miles, or 22·33 per cent. of the total area. The area coming within the provisions of the Dominion Forest Reserves and Parks Act comprises 25,201½ square miles distributed over 25 districts. The average exports (1908–11) of timber aggregate £9,085,000 (United Kingdom, £2,290,000; United States, £5,890,000; and other countries, £905,000). A return for 1909 showed that 2,906 million cubic feet of material was cut per annum in Canadian forests, of an aggregate value of 34 millions sterling. (1911, 35 million; 1912, 37½ million).

The forest area is thus distributed: British Columbia, 285,000 square miles; Manitoba, Saskatchewan, Alberta, and the Territories, 281,000 square miles; Quebec, 187,500 square miles; Ontario, 62,500 square miles; New Brunswick, 12,000 square miles; and Nova Scotia, 7,000 square miles.

Exports of Forest Produce. Last Five Census Year

	United Kingdom.	*United States.*	*Total.*
	£1,000	£1,000	£1,000
1871	2,391	1,882	4,750
1881	3,033	1,716	5,129
1891	2,291	2,417	4,990
1901	3,219	2,508	6,170
1911	2,460	5,917	9,340
Increase or decrease per cent. in last intercensal period.			
	−23·6	+136	+51

AGRICULTURE

Average Area and Production of Chief Crops 1908–11

	1,000 *acres.*	1,000 *bushels.*	1912. 1,000 *ac.*
Oats	9,082	319,000	9,217
Hay	8,209·75	12,889·5*	7,634
Wheat	8,506	161,000	9,758
Barley	1,712	47,000	1,415
Mixed grains	575	18,625	522
Potatoes	494·75	78,250	472
Flax	471·3	5,100	1,678
Peas	369·75	6,550	251
Corn for husking	341	19,875	293
Buckwheat	300	7,500	387
Fodder Corn	279	2,708·75*	278
Turnips, &c.	245·75	97,250	227
Rye	107	1,925	136
Beans	57·5	1,200	59·8
Beetroot sugar	14·4	117·5*	19
Av. area under field crops	30,764·4		32,349

* 1,000 tons.

Percentage of Mean Production of Chief Crops by Provinces

	Alberta.	*B. Col.*	*Manitoba.*	*N. B.*	*N. S.*	*Ontario.*	*P. E. Is.*	*Quebec.*	*Sask.*	*Canada.*
	%	%	%	%	%	%	%	%	%	%
Wheat	5·0	0·3	35	0·2	0·3	15·5	0·4	1·3	42	100
Barley	4·5	0·2	35·1	0·2	0·6	45·1	0·3	5·5	8·5	100
Oats	5·5	0·7	17·1	2·2	1·6	36	2·3	14·6	20	100
Rye	1·1	—	6·8	—	0·6	71·9	—	16·8	2·8	100
Maize	—	—	—	—	0·05	95·45	—	4·5	—	100
Potatoes	3·5	3·5	6·3	8·3	9·9	25·0	7·5	28·5	7·5	100
Turnips, &c.	1·5	0·4	2·7	3·0	9·5	68·7	4·0	8·4	1·8	100

Live Stock. Average No. (1907–11) in Thousands

Cattle	836	53*	413	215	333	2,716	107·7	1,490	720	6,884
Sheep and lambs	171	18	24	149·5	364	1,097	96·3	569	140	2,629
Pigs	131	14·4	153	76·5	71·5	1,745	48·2	687	316	3,243
Horses	268	36	203	59·5	67·3	728	33·2	363	432	2,185

* 1911 Returns alone available in British Columbia.

FISHERIES

Principal Items of Catch. Value in £1,000. *Av. of 3 years,* **1908–9 to 1910–11. Salmon, 1,385. Cod, dried, 837. Lobsters, 797. Herrings, 512. Halibut, 242. Whitefish, 192. Haddock, 189. Mackerel, 184. Smelts, 147. Trout, 145.**

Value of Catch in £1,000. *Av. of 5 years,* **1906–11. Nova Scotia, 1,712. British Columbia, 1,606. New Brunswick, 977. Ontario, 405. Quebec, 395. Prince Edward Island, 263. Manitoba, Saskatchewan, Alberta, and Yukon, 262.** Total Canada, 5,620.

FISH

Principal Countries to which Exported (Av. of 3 Years 1909–10–11)

United Kingdom, £901,000 ; Brit. West Indies, £247,000 ; other British **possessions, £169,500.** Total British Empire, £1,317,500. United States, **£954,000 ; France,** £201,000 ; Brazil, £145,000 ; other foreign countries, **£442,000. Total,** foreign countries, £1,742,000. Total, Canada, £3,059,000.

On an average (1909–10–11), 1,623 vessels (tonnage (39,000) valued at £675,000, and 40,000 boats valued at £413,000, are employed in the Canadian fisheries, in which £3,553,000 represents the average capital invested. The number of persons employed in the fishing industry is 90,000, of whom 69,500 are fishermen.

IMMIGRATION. (Emigration returns are not recorded)

	Average of 10 *years,* 1902–3 *to* 1911–12.	*Highest year* (1911–12).
English and Welsh	57,950	96,800
Scots	16,750	33,000
Irish	4,700	8,300
Total British	79,400	138,100
Austro-Hungarians	12,850	21,650
Italians	6,300	7,600
Russians	4,500	9,800
Germans	2,400	4,650
Swedes	2,000	2,400
Other immigrants	21,950	36,300
Total, European and other	50,000	82,400
From the United States	70,800	133,700
Total immigrants	200,200	354,200

It is interesting to note that during the period 1902–12 the two millions of immigrants distributed themselves 28·6 per cent. to Saskatchewan and Alberta, 24·4 per cent. to Ontario, 16·2 per cent. to Manitoba, 14·5 per cent. to Quebec, 11·7 per cent. to British Columbia, 4·25 per cent. to the Maritime Provinces, while the destinations of the balance (0·35 per cent.) were not declared. Of the 665,000 immigrants entering the country in the years 1911–12, 40 per cent. were farmers, or of farm labourers' class, 25½ per cent. were general labourers, 11½ per cent. were mechanics, 5·6 per cent. female servants, 5 per cent. clerks, 2·4 per cent. miners, while the balance of 10 per cent. were not classified.

MINERAL PRODUCTION BY PROVINCES

	N. S. £1,000	*N. B.* £1,000	*Quebec.* £1,000	*Ontario.* £1,000	*Manitoba.* £1,000	*Alberta.* £1,000	*Sask.* £1,000	*Yukon.* £1,000	*B. Col.* £1,000	*Total.* £1,000
Average of 5 years, 1907–11	2,922	127·2	1,521	7,588·7	240·9	1,283·7	103·6	841	4,832·8	19,460·9
Percentage of total product	15·01	0·65	7·82	39	1·23	6·6	0·53	4·33	24·83	100

GOLD. PRODUCTION BY PROVINCES. VALUE

	B. Col. £	*Yukon.* £	*Alberta.* £	*Nova Scotia.* £	*Ontario.* £	*Quebec.* £	*Total Value.* £
1871	370,000	—	—	77,000	—	—	447,000
1881	215,000	—	—	43,000	—	12,000	270,000
1891	88,000	8,100	1,130	93,000	400	370	191,000
1901	1,093,300	3,700,000	3,100	112,400	50,400	600	4,958,000
1911	1,014,000	952,600	40	33,000	8,800	2,600	2,011,000
Increase or decrease per cent. in intercensal period 1901–11	−7·3%	−74·3%	−98·7%	−70·6%	−82·6%	+334%	−59·44
Average 5 years 1907–11	1,084,000	816,450	176	42,750	10,900	760	1,955,036
Percentage of total output	55·4	41·7	—	2·1	0·55	—	

SILVER. PRODUCTION AND VALUE

	British Columbia.		*Ontario.*		*Quebec.*		*Yukon.*		*Total.*	
	oz. 1,000.	*value* £1,000.	*oz.* 1,000.	*value* £1,000.	*oz.* 1,000.	*value* £1,000.	*oz.* 1,000.	*value* £1,000.	*oz.* 1,000.	*value* £1,000.
1891	3·3	0·671	225·6	45·9	185·6	27·7	—	—	414·5	74·27
1901	5,151·3	624·2	151·4	18·35	41·46	5·0	195	24	5,539·2	671·55
1911	1,887·1	206·7	30,540·7	3,345	18·435	2	112·7	12·35	32,559	3,566·0
Increase or decrease per cent. in intercensal period 1901–11	−64	−66·87	+20,072	+18,130	55·6	−60	−42·2	−48·6	+487	+431
Average of 5 years, 1907–11	2,462	364	23,022	2,552·1	13·6	1·56	68·7	7·66	25,566·3	2,925·32

PRODUCTION OF PIG-IRON

	Nova Scotia.		*Ontario.*		*Quebec.*		*Total.*	
	tons * 1,000.	*value* £1,000.	*tons* * 1,000.	*value* £1,000.	*tons* * 1,000.	*value* £1,000.	*tons* * 1,000.	*value* £1,000.
1891	21·3	63	—	—	2·5	12·2	23·9	75·3
1901	151·1	362·6	116	329·4	6·8	30·7	274·3	722·7
1911	390·2	962·3	527	1,563	0·66	3·5	917·5	2,528·8
Increase or decrease per cent. since 1901								
	+158	+165	+354	+370	−90·3	−88·6	+234	+249
Av. of years 1906–11	353	806·6	367	1,160	5·5	27·6	725·5	1,994·2

PRODUCTION OF COAL BY PROVINCES

	N. S. *tons* * 1,000.	*B. Col.* *tons* * 1,000.	*Alb.* *tons* * 1,000.	*Sask.* *tons* * 1,000.	*Yukon.* *tons* * 1,000.	*N. B.* *tons* * 1,000.	*Total.* *tons* * 1,000.
1881	1,280	257	—	—	—	—	1,537
1891	2,268	1,130	—	—	—	5·4	3,578
1901	4,158	1,919	340	45	6	18	6,486
1911	7,004	2,542	1,511	207	2·8	56	11,323
Increase or decrease per cent. in last intercensal period							
	+68	+32	+344	+360	−53	+211	+74
Average 1907–11	6,419	2,637	1,935	176	9	51	11,227

OTHER MINERALS

Lead. Average product., 1907–11, 38,713,000 lb. (£334,000).

Nickel. Average quantity in matte shipped, 1907–11, 27,597,000 (£2,000,000).

Asbestos. Average product., 1907–11, 148 million lb. (£526,700).

Copper. Average product., 1907–11, 56·8 million lb. (£1,667,000).

POST OFFICE SAVINGS BANKS

	Savings Bks. No.	*Deposits.* £1,000.	*With-drawals.* £1,000.	*Amnt. to credit of open acc.* £1,000.	*No. of open acc. at end of year.*
1871	230	394	224·7	513·3	17,153
1891	634	1,336	1,619	4,468	111,230
1911	1,151	2,009	2,357	8,906	147,478
Average 5 years, 1907–11.					
	—	2,121	2,557	9,180	153,180

DOMINION GOVERNMENT SAVINGS BANK (IN £1,000)

1871. Deposits, 114·4; withdrawals, 81·27; credit, 425·9.
1891. Deposits, 587·2; withdrawals, 993·3; credit, 3,629.
1911. Deposits, 480·4; withdrawals, 550·7; credit, 3,034.
Average of years 1908–12. Deposits, 476; withdrawals, 583; credit, 3,040.

INDUSTRIES. (Census 1911 for year 1910)

Principal groups of industries.	*Establishments.* *No.*	*Capital.* £1,000.	*Employes on wages.* *No.*	*Wages paid.* £1,000.	*Value of products.* £1,000.	*Increase of capital %,* 1900–10.	*Increase of products %,* 1900–10.
Food products	6,985	27,350	52,730	2,980	50,505	132·7	96·2
Textiles	1,444	22,365	72,672	5,485	27,935	79·5	100·67
Iron and steel products	824	25,398	48,558	5,300	23,360	202·39	225·8
Timber and lumber and re-manufact.	4,999	53,425	110,049	8,094	37,955	188·9	129·8
Leather and its finished products	399	10,030	22,742	1,983	12,920	127·59	81·0
Paper and printing	773	12,890	22,894	2,234	9,550	133·67	124·94
Metals and metal products other than steel	341	13,800	17,502	2,010	15,055	229·37	274·42
Vehicles for land transportation	465	10,155	35,778	4,010	14,325	208·84	249·06
Other industries	2,988	81,057	88,201	8,430	48,065	247	200
Totals	19,218	256,470	471,126	40,526	239,670	179·15	142·38

INDUSTRIES BY PROVINCES. Census 1911

	Value of products. £1,000.	*Increase % in 1900 to 1910 in value of products.*	*% total products.*		*Value of products.* £1,000.	*Increase % in 1900 to 1910 in value of products.*	*% total products.*
Alberta	3,862	1,330·64	1·6	Ontario	119,183	140·05	49·8
British Columbia	13,403	234·77	5·6	P. E. Island	645	34·8	0·3
Manitoba	11,031	315·19	4·6	Quebec	72,130	121·69	30·05
New Brunswick	7,281	68·89	3·0	Saskatchewan	1,301	871·68	0·55
Nova Scotia	10,834	123·4	4·5		239,670	142·38	100·0

THE TRADE OF CANADA

	Imports. £1,000.	*Exports.* £1,000.	*Aggregate.* £1,000.
1871	19,750	15,240	34,990
1881	21,670	20,200	41,870
1891	24,650	20,230	44,880
1901	39,126	40,374	79,500
1911	114,971	64,815	179,786

TRADE AVERAGES

Imports.				*Exports.*			
Average of 5 yrs.	£1,000.	*H.Y.*	£1,000.	*Average of 5 yrs.*	£1,000.	*H.Y.*	£1,000
1897–1901	32,940	1901	39,126	1897–1901	34,900	1901	40,374
1902–6	52,360	1906	60,492	1902–6	45,660	1906	52,743
1907–11	86,480	1911	114,971	1907–11	59,833	1911	64,815

PRINCIPAL ITEMS OF TRADE

Principal Imports.

VERAGE, 5 YRS., 1907–8 to 1911–12.

	£1,000.	% of total.
Iron, steel, and manufactures thereof	14,320	16·5
Coal	6,570	7·6
Woollen manufactures	4,549	5·2
Cotton manufactures	3,620	4·2
Wood and manufactures	2,840	3·3
Sugar (not maple)	2,690	3·1
Bullion and specie	2,416	2·8
Drugs, dyes, and chemicals	2,218	2·5
Fruits, dried and fresh	2,120	2·4
Cotton, raw	1,716	2·0
Indian corn	1,620	1·8
Hides, horns, &c.	1,450	1·6

Principal Exports.

AVERAGE, 5 YRS., 1907–8 to 1911–12

	£1,000.	% of total.
Wheat	11,520	19·2
Forest produce	9,085	15·14
Cheese	4,400	7·33
Fish	3,000	5·00
Silver ore and silver	2,960	4·93
Flour	2,480	4·13
Cattle	1,786	2·97
Bacon and hams	1,776	2·96
Specie	1,440	2·40
Gold-bearing quartz	1,436	2·39
Copper and ore	1,296	2·16
Coal	1,054	1·75
Fruit	977	1·62
Hides, horns, &c.	950	1·57

It is of interest to note that in Census year 1911, Ontario received 43·9 per cent. of the total imports, Quebec 30 per cent., British Columbia 8·2 per cent., Manitoba 7·4 per cent., Nova Scotia 3·5 per cent., New Brunswick 2·4 per cent., Saskatchewan 2·3 per cent., Alberta 1·9 per cent., Yukon 0·2 per cent., and Prince Edward Island 0·1 per cent. In the same year 41·73 per cent. of the total exports left Quebec, 31·5 per cent. Ontario, 9·52 per cent. New Brunswick, 7·75 per cent. British Columbia, 6·75 per cent. Nova Scotia, 1·36 per cent. Saskatchewan, 1·05 per cent. Manitoba, 0·15 per cent. Prince Edward Island, 0·12 per cent. Alberta, and 0·07 per cent. Yukon.

TRADE WITH PRINCIPAL COUNTRIES*

Theoretically the imports of one country from another should coincide with the exports of the country from which they purport to be consigned to the importing country; in reality freight, insurance, and other charges, together with the diversion of goods exported when *en route* and variations in methods of valuation, render comparison impracticable.

AVERAGE OF 5 YEARS, 1907–8 to 1911–12

Imports from—	£1,000.	*Total* %	*Exports to—*	£1,000.	*Total* %
United Kingdom	20,040	23·9	United Kingdom	29,053	48·5
British West Indies	1,381	1·6	Newfoundland	785	1·3
British East Indies	823	0·9	Australia	703	1·2
Other British Possessions	1,484	1·8	British West Indies	669·6	1·1
			Other British possessions	1,050	1·8
Total British Empire	23,728	28·2	Total British Empire	32,260·6	53·9
Foreign countries :—			Foreign countries :—		
United States	51,630	61·5	United States	23,024	38·5
France	2,118	2·5	South America	812	1·4
Germany	1,779·6	2·1	Belgium	687	1·1
South America	682	0·8	Germany	527·4	0·9
Other foreign countries	3,991·4	4·9	France	515	0·8
			Other foreign countries	2,006·8	3·4
Total foreign countries	60,201	71·8	Total foreign countries	27,572·2	46·1
Total imports for home consumption	83,929	100	Total exports	59,832·8	100

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* Imports credited to countries from which they were received directly; exports to countries to which they were exported.

STEAM RAILWAYS

Year ended June 30.	*Miles in operation.*	*No. of passengers (mill.).*	*Tons* of freight (mill.).*	*Earnings. Gross (mill. £).*	*Working expenses (mill. £).*	*Ratio of expenses and receipts.*	*Degree of activity, i.e. train mileage ÷ miles in operation.*
1881	7,260	7	12	5·7	4·1	71·89	3,761
1891	14,009	13	21·7	9·9	7·1	72·56	3,098
1901	18,140	18	37	14·9	10·3	69·06	2,941
1911	25,400	37	79·9	38·8	26·9	69·43	3,533

PER MILE OF LINE OPERATED

	No. of Passengers.	*Tons of freight.*	*Gross earnings.* £	*From freight.* £	*From Passengers.* £	*Working expenses.* £
1901	1,014	2,040	826	528·6	219·8	570·9
1911	1,460	3,145	1,527	1,023	409·2	1,060

* Ton = 2.000 lb.

RAILWAYS

Distribution of Steam Railway Mileage by Provinces, 1911

Ontario.	Quebec.	Manitoba.	Sask.	Alberta.	B. Col.	N. B.	N. S.	P. E. Isl.	Yukon.	Canada.
8,322	3,882	3,466	3,121	1,494	1,842	1,548	1,354	269	102	25,400

Miles of Railway per 1,000 Sq. Miles of Territory, 1911

Ontario.	Quebec.	Manitoba.	Sask.	Alberta.	B. Col.	N. B.	N. S.	P. E. Isl.	Yukon.	Canada.
31·9	11	47	12·3	5·4	5·1	55·2	63·2	123	0·49	6·8

Miles of Railway per 1,000 Inhabitants, 1911.

Ontario.	Quebec.	Manitoba.	Sask.	Alberta.	B. Col.	N. B.	N. S.	P. E. Isl.	Yukon.	Canada.
3·2	1·9	7·6	6·3	3·9	4·6	4·4	2·7	2·8	12	3·6

The average receipts of the steam railways (1907–11) amounted to £32,900,000, the working expenditure to £23,400,000. The average number of locomotives in use was 3,928; the train miles run 78,000,000; passengers carried 34,500,000; average passenger journey 65 miles; average goods traffic amounted to 62,000,000 tons (avoir.); and average haul per ton 193 miles. The gross receipts per mile of line open averaged £1,374; gross receipts per train mile 8*s.* 0·066*d.*; working expenses per mile of line open £973; and working expenses per train mile 5*s.* 8·31*d.*

The electric railways of Canada in 1911 covered 1,224 miles (showing an increase of 121 per cent. in the last intercensal period). The passenger traffic receipts for the period 1907–11 averaged £3,000,000, the gross earnings £3,280,000, and the net earnings £1,300,000. The capital of the electric railways in 1911 amounted to £23,000,000 and that of steam railways to £380,450,000.

CANALS

Length of canal (1,594 m.), river, and lake navigation system	2,700 miles
Cost of construction and enlargement	£20,410,000

	Vessels through.							
	Canadian.		*American.*		*Totals.*			
Year.	*No.*	*Tonnage. 1,000 tons.**	*No.*	*Tonnage. 1,000 tons.*	*No.*	*Tonnage. 1,000 tons.*	*Passengers. No. in thousands.*	*Freight in tons.*
1891	19,246	3,135	3,602	835	22,848	3,970	146	2,902,526
1901	20,860	3,980	5,634	2,482	26,494	6,462	190	5,665,259
1911	25,585	9,172	10,370	18,232	35,955	27,404	305	38,030,353
Increase per cent. in last decensal period.								
	22	130	84	634	35	342	60	571
Average of five years, 1907–11.								
	26,200	7,805	9,700	15,319	35,900	23,124	291	30,557,600

* ton = 2,000 lb.

SHIPPING BY QUINQUENNIAL PERIODS

Total net tonnage entered and cleared in the five years.	1,000 tons.	Oversea trade. Highest year.	1,000 tons.	Average tonnage of Brit. ves.			Average tonnage of Sail. ves.	
				Brit. ves. 1,000 tons.	Can. ves. 1,000 tons.	For. ves. 1,000 tons.	Sail. ves. 1,000 tons.	Steamers. 1,000 tons.
1897–1901	13,250	1901	14,543	6,240	1,880	5,130	2,860	10,390
1902–6	15,770	1906	16,843	7,950	2,120	5,700	2,385	13,385
1907–11	21,390	1911	24,590	11,570	3,370	6,450	1,953	19,437
			Lake and River Trade					
1897–1901	12,040	1900	12,739	—	6,600	5,440	2,098	9,942
1902–6	16,600	1906	17,889	—	8,360	8,240	2.572	14,028
1907–11	23,600	1911	28,384	—	11,760	11,840	2,514	21,086

NATIONALITY OF OVERSEA SHIPPING

	Average of four years, 1907–10. 1,000 tons.	% of total.	1910 1,000 tons.	% of total.
British Empire	14,429	70·08	16,054	71·98
Foreign:				
United States	3,439	16·7	3,184	14·28
Norway and Sweden	1,870·5	9·08	1,760	7·9
Japan	425·5	2·06	583	2·62
Germany	275	1·33	365	1·64
France	141·5	0·7	96	0·43
Other foreign countries	8·5	0·05	55	1·15
Total foreign countries	6,160	29·92	6,243	28·02
Total tonnage	20,589	100	22,297	100

SHIPS BUILT AND REGISTERED

During the period 1907–8—1911–12 the average number of vessels built in the Dominion was 300, and the average tonnage 31,377. The average number of vessels on the register during those five years was 7,777, of an average tonnage of 727,960.

PRINCIPAL PORTS

Av. Ton. Entered and Cleared (Ocean Trade), 1907–11

	1,000 tons.		1,000 tons.
Montreal	2,995	Quebec	2,045
Victoria	2,956	St. John	1,960
Vancouver	2,793	Sydney, N.S.	809
Halifax	2,657	Nanaimo, B.C.	650

CANADA. POPULATION. 1. PROGRESS

	Male.	Inc. % in intercensal period.	Female.	Inc. % in intercensal period.	Total.	Inc. % in intercensal period.
1881	2,188,854	24	2,135,956	24	4,324,810	—
1891	2,460,471	12·4	2,372,768	11	4,833,239	11·76
1901	2,751,708	11·8	2,619,607	10·4	5,371,315	11·3
1911	3,821,995	38·8	3,384,648	29	7,206,643	34·16

2. POPULATION BY PROVINCES

Province	1911.	1901.	In. or dec.	In. (+) or dec. (—) per cent.	Pop. per sq. mile.	Males per 1,000 females
Alberta	374,663	73,022	301,641	+413·08	1·47	1,486
British Columbia	392,480	178,657	213,823	+119·68	1·09	1,786
Manitoba	455,614	255,211	200,403	+ 78·52	6·18	1,216
New Brunswick	351,889	331,120	20,769	+ 6·27	12·61	1,045
Nova Scotia	492,338	459,574	32,764	+ 7·13	22·98	1,040
Ontario	2,523,274	2,182,947	340,327	+ 15·58	9·67	1,061
Prince Edward Is.	93,728	103,259	—9,531	— 9·23	42·91	1,000·8
Quebec	2,003,232	1,648,898	354,334	+ 21·49	5·69	1,019
Saskatchewan	492,432	91,279	401,153	+439·48	1·95	1,453
Yukon	8,512	27,219	—18,707	— 68·73	24·3*	3,247
N.W. Territories	18,481	20,129	—1,648	— 8·18	104*	1,017
Total	7,206,643	5,371,315	1,835,323	+ 34·17	1·93	1,129

* Square miles of territory to each inhabitant.

PULATION. COUNTRIES OF ORIGIN

	1911.	Inc. or dec. % in ten years.	No. of each origin per 100 pop.
British	3,896,985	27·22	54·08
Including:—			
English	1,823,150	44·59	25·30
Irish	1,050,384	6·24	14·58
Scotch	997,880	24·71	13·85
Welsh	24,848	89·17	0·34
French	2,054,890	24·59	28·51
German	393,320	26·67	5·46
Austro-Hungarians	129,103	610·22	1·79
Scandinavian	107,535	246·42	1·49
Indian	105,492	—17·55	1·46
Others	519,318	+ 203	7·21
Total	7,206,643	34·17	100

PRINCIPAL RELIGIONS, 1911

	1,000.	*Percent. of total pop.*	*Inc. % 1901–11.*
Roman Catholic	2,833	39·31	27·06
Presbyterian	1,115·3	15·48	32·39
Methodist	1,079·9	14·99	17·78
Anglican	1,043	14·47	53·05
Baptist	382·7	5·31	20·33
Lutheran	229·9	3·19	148·43

URBAN AND RURAL POPULATION

1. The Dominion

	1911.	*Increase on 1901 census*	*Increase %.*
Urban	3,280,964	1,259,165	62·3
Rural	3,925,679	576,163	17·2
	7,206,643	1,835,328	34·17

2. By Provinces

	1911.		*Inc. or dec. on 1901.*	
	Rural. 1,000.	*Urban.* 1,000.	*Rural.* 1,000.	*Urban.* 1,000.
Alberta	232·7	141·9	180·3	121·3
British Columbia	188·8	203·7	100·3	113·5
Manitoba	255·2	200·4	70·5	129·9
New Brunswick	252·3	99·5	—1·5	22·3
Nova Scotia	306·2	186·1	—24	56·7
Ontario	1,194·8	1,328·5	—52·2	392·5
Prince Edward Island	78·8	15	—9·5	—
Quebec	1,032·6	970·6	39·9	314·4
Saskatchewan	361·1	131·4	287·3	113·9
Yukon	4·6	3·9	—13·4	—5·3
North-West Territories	18·5	—	—1·6	—

FINANCE

	Revenue.		Expenditure.	Debt.
Average.	£1,000.	*Customs rev.* £1,000.	£1,000.	*Gross liabilities* £1,000.
1897–1901	9,460	5,060	8,640	70,500
1902–6	14,220	8,120	11,860	76,560
1907–11	22,060	13,280	17,500	96,220

BANKS AND BANKING

General Statement of Chartered Banks

	Capital paid up. £1,000.	*Notes in circulation.* £1,000.	*Total Liabilities* £1,000.	*Assets.* £1,000.
1871	7,623	4,297	16,500	19,070
1891	12,470	6,795	38,500	55,370
1911	21,160	18,490	225,500	267,800
Average 1907–11	20,193	16,165	186,250	224,820

NEWFOUNDLAND AND LABRADOR

Newfoundland: area 42,734 square miles, i.e. 35 per cent. of that of United Kingdom.

Labrador: area 120,000 square miles, i.e. approximately that of United Kingdom.

AGRICULTURE

Statistics are confined to a few data collected in census years. The total area occupied in pasture in 1901 was 35,000 acres, in gardens 35,800 acres, and otherwise 144,500 acres, total 215,500 acres. The produce of the principal crops are as follows: oats, 8,500 bushels; potatoes, 1,533,000 bushels; turnips, 231,000 bushels.

LIVE STOCK

Census, 1911. Horses, 13,694 (1901, 8,851); horned cattle, 39,472 (1901, 32,767); sheep, 97,597 (1901, 78,052); pigs, 26,956 (1901, 34,679).

FISHERIES

WHALE. Average number captured, 1906–10, 480 (highest year 518, in 1909). Average products: guano, 871 tons; bone, 730 tons; oil, 478,000 gallons.

SEAL. Average number of men employed, 3,654. Seal caught, 280,000 (342,000 in 1906). Weight, nett, 6,130 tons (7,896 in 1906). Value £103,800 (£129,000 in 1910).

AVERAGE EXPORTS OF COD IN PEACE TIME *

Quintals × 1,000

1675 [1]	270	1780–90	702	1871–80	919
1676 [2]	219	1811–20	921	1881–90	1,048
1749–51 [3]	422	1841–50	970	1891–1900	1,165
1766–70 [4]	553	1851–60	1,074	1901–10	1,415
1771–4	512	1861–70	863	1911	1,183

[1] Settlers get 69,250 Q.; adventurers' ships thrice as much (Sir J. Berry).

[2] Settlers get 40,643 Q.; ships 178,800 Q. or 176,732 Q. (Captains Russell and Wyborne).

[3] After 1713 British got old French colony, but did not exploit its fisheries till 1727, or exploit them much till 1739.

[4] Labrador fisheries began 1763, and became important 1815.

AVERAGE ANNUAL VALUE OF FISH EXPORTS *

	1881–90. £1,000.	1891–1900. £1,000.	1901–5. £1,000.	1906–10 £1,000.	1911. £1,000.
Cod	954	870	1,265	1,652	1,419
Seal [1] . . .	143	108	148	136	136
Herring [2] . .	39	40	71	69	80
Lobster [3] . .	44	89	89	76	74
Whale . . .	2·6	1	46	40	38
Salmon [4] . . .	16	15	17	12	11
Total fish, &c.	1,199	1,123	1,636	1,985	1,758

[1] Sealing trade began *c.* 1735 from Fogo, Twillingate, &c.; colonial sealing ships were used 1793 et seq.; steamers 1863 et seq.

[2] Herring trade began, after 1818, from the Treaty shore, &c.

[3] Lobster trade began *c.* 1880 from the Treaty shore, &c.

[4] Salmon trade began from north of Bonavista Bay (*c.* 1718), Salmonier (c. 1722), Fogo, &c. (*c.* 1733).

* By J. D. Rogers.

RAILWAYS

Length of line open: Government 723 miles, private 47 miles. Receipts from Government railway, 1911, £128,740 (1912, £130,180); working expenditure, 1911, £136,442 (1912, £157,645).

MINERALS

COPPER (Tilt Cove, Little Bay, and Betts' Cove were worked in 1864, 1878, and 1879 respectively)

Average domestic exports.	1,000 *tons of ore.*	*Highest year.*	1,000 *tons.*	*Average value.* £1,000.	*Highest year.*	£1,000.
1897–1901	68	1900	85·8	86·84	1900	127
1902–6	77	1902	83	85·7	1902	98·8
1907–11	46	1907	55·9	49·52[1]	1907	57·3

[1] Two per cent. of average total exports.

IRON ORE AND PYRITES (Bell Island and Pilley Island were worked in 1896 and 1888 respectively)

1897–1901	324	1901	746	82·8	1901	159
1902–6	738	1906	913	181·4	1906	216
1907–11	1,007	1911	1,181[1]	232*	1911	271

* Nine and a half per cent. of average total exports.
[1] Domestic Exports of 'iron ore'.

The average annual value of mineral exports from 1881–90 was copper £55,000, iron £4,000; 1891–1900, copper £85,000, iron £45,000; 1901–10, copper £70,900, iron £194,500; 1911, copper £47,600, iron £271,000.

A small quantity of gold, valued at about £11,000 per annum, is obtained from the copper ore; the average output (1896–10) was 2,500 oz., valued at £10,970.

SHIPPING

TOTAL NET TONNAGE ENTERED AND CLEARED, EXCLUSIVE OF COASTING TRADE

Average of 5 years.	1,000 *tons.*	*Highest year.*	1,000 *tons.*	*Av. Brit. ship.* 1,000 *tons.*	*Av. for. ship.* 1,000 *tons.*	*Av. tonnage Sail. ves.* 1,000 *tons.*	*St. ves* 1,000 *tons.*
1897–1901	1,153	1900	1,447	951	202	194	959
1902–6	1,773	1906	1,864	1,086	687	222	1,551
1907–11	1,995	1911	2,252	1,113	882	196	1,799

NATIONALITY OF SHIPPING (AVERAGE OF FIVE YEARS, 1907–11)

	1,000 *tons.*	*Percent. of total.*	*H.Y.* 1911. 1,000 *tons.*	*Percent. of total.*
United Kingdom	690	34·6	840	37·3
Colonial	423	21·2	405	17·99
Total British Empire	1,113	55·8	1,245	55·29
Norwegian	777	39·9	929	41·25
Total Foreign	882	44·2	1,007	44·71
Grand total	1,995		2,252	100

VESSELS BUILT. The average annual output (1907–11) was 74 vessels of a net tonnage of 2,630, of which 73 (net tonnage 2,610) were sailing vessels.

VESSELS ON REGISTER. Average, 1907–11. Sailing, 3,294 (net tonnage 131,700); steam, 69 (net tonnage 14,600).

CHIEF PORTS. Average tonnage, 1907–11. St. John's, 809,000. Bell Island, 771,000. Port-aux-Basques, 107,000. Tilt Cove, 41,000. Lewisport, 26,000. Botwood, 25,000. Channel, 20,500. Placentia, 16,250.

IMPORTS AND EXPORTS (Inclu. Labrador)

	Imports (including bullion and specie).				*Exports (including bullion and specie).*			
Average of 5 years.		*Highest year.*		*Average imports from United Kingdom.*	*Average exports.*	*Highest year.*		*Average exports to United Kingdom.*
	£1,000.	£1,000.	£1,000.	£1,000.	£1,000.	£1,000.	£1,000.	£1,000.
1897–1901	1,332	1900	1,540	409	1,400	1900	1,773	325
1902–6	1,910	1906	2,140	500	2,165	1906	2,484	406
1907–11	2,447	1911	2,751	570	2,408	1907	2,487	341

PRINCIPAL ARTICLES IMPORTED AND EXPORTED

IMPORTS.

	Average 1907–11. £1,000.	*Percentage of total.*
Flour	382	15·9
Coal	133	5·5
Pork, salted	97·6	4
Beef, salted, &c.	92·3	3·8
Blankets, quilts, rugs	81·6	3·4
Hardware	77	3·2
Machinery	76·1	3·1
Oils and lard for butterine	70·6	2·9
Molasses	62	2·5
Cotton fabrics	58·6	2·4
Leather	51·4	2·1
Bullion and specie	46	1·9
Railway material	44·6	1·8
Apparel	42	1·75
Sugar	40·6	1·6
Tea	35	1·4
Cordage materials	33·6	1·4
Tweeds, cloths, &c.	31·6	1·3

EXPORTS.

	Average 1907–11. £1,000.	*Percentage of total.*
FISH :—		
Cod, dried	1,518·6	63
Lobster, tinned	76	3·25
Herrings, pickled	36·5	1·5
Herrings, various	18·0	0·75
Herrings, frozen	16·4	0·7
Salmon, pickled	10·7	0·4
Salmon, fresh	2·6	0·1
OIL :—		
Cod, unrefined	71·26	2·9
Seal oil	76·2	3·1
Whale oil	31·8	1·3
Seal skins	61·8	2·5
Lumber	37·6	1·5

Note.—Av. val. of paper exp. (1910–12) was £171,000 (1912 £247,000); of pulp £46,700 (1912 £74,250). For iron and copper exp. vide Minerals.

TRADE WITH PRINCIPAL COUNTRIES

(Vide Notes on p. 480.)

IMPORTS.

	Average 1907–11. £1,000.	*Total %*	*Highest year,* 1911. £1,000.
Un. King.	570	23·3	636
Canada	864·6	35·34	947
Br. W. Ind.	62·6	2·55	70·5
Other Br. Pos.	17·8	0·72	19
Total Br. Em.	1,515	61·91	1,672·5
For. Countries :			
Un. States	865·5	35·37	1,016
Spain	19·5	0·8	18
Other Foreign Countries	47	1·92	44·5
Total Foreign Countries	932	38·09	1,078·5
Total imports	2,447	100	2,751

EXPORTS.

	Average 1907–11. £1,000.	*Total %*	*Highest year,* 1907. £1,000.
Un. King.	341	14·2	306·8
Canada	338	14	331·2
Br. W. Ind.	90	3·75	88·5
Other Br. Pos.	7	0·3	4·6
Total Br. Em.	776	32·25	731·1
For. Countries :			
Brazil	413	17·2	424·1
Portugal	344	14·3	378·6
Italy	243	10	273·7
United States	240	10	286·6
Spain	202	8·4	204·4
Other For. Co	190	7·85	188·9
Total For. Co.	1,632	67·75	1,756·3
Total exports	2,408	100	2,487·4

POPULATION

	Newfoundland.	*Labrador.*	*Total.*	*Increase %.*
1884	193,124	4,211	197,335	22·3
1891	197,934	4,106	202,040	2·3
1901	217,037	3,947	220,984	9·37
1911	238,680	3,939	242,619	9·7

DENSITY OF POPULATION

Newfoundland, 5·6 inhabitants per sq. mile.
Labrador, 0·03 inhabitants per sq. mile, or 30·4 sq. miles per inhabitant.

POPULATION (IN THE NINETEENTH CENTURY AND AFTER) OF ELECTORAL DISTRICTS IN THOUSANDS[1]

	1822.	1827.	1836.	1845.	1857.	1869.	1884.	1891.	1901.	1911.
OLD BRITISH COAST										
St. John's[2]	13	15	19	25	30·5	29	38	36	40	46
Rest of south-east[3]	2·5	4	5	5	5	6	6·5	6	6	6
Conception Bay[4]	19	18	23	28	33	39	47	46·5	44·5	44
Trinity Bay	4	5	7	9	11	14	19	19	21	22
EXTENSIONS OF OLD BRITISH COAST										
Bonavista Bay	4	5	5	7	9	11	16·5	18	20·5	23
Fogo and Twillingate[5]	3	3·5	5	7	10	13	20·3	23·5	27	31
OLD FRENCH COAST[6]	6·5	8	11	16	17	22	27	29·5	34	37·6
ENGLISH EXTENSIONS OF OLD FRENCH COAST[7]	Nil				3·5	5	6·6	6·5	7	7·7
TREATY SHORE[8]	Almost Nil	2	2	2	3	5	12	13	17	22
LABRADOR[9]	Do.				1·6	2·5	4·2	4	4	4
Total	52	60	77	99	124	147	197	2	221	243

[1] By J. D. Rogers. [2] Split into two. [3] Ferryland and Trepassey. [4] Harbor Grace, Bay-de-Verde, Carbonear, Harbour Maine, Port de Grave. [5] Split into two in 1885. [6] Placentia, Burin, and Fortune Bay. [7] Burgeo and La Poile. [8] St. George's Bay and St. Barbe. [9] Not an electoral district.

GROWTH OF POPULATION, 1901–11, BY DISTRICTS

	1911.	*Inc. + or Dec. – %* 1901–11.		1911.	*Inc. + or Dec.* 1901–11.
Bay-de-Verde	10,213	+ 3·8	Placentia & St. Mary's	16,099	+ 5·9
Bonavista	22,894	+ 11·3	Port-de-Grave	6,986	– 6·1
Burgeo and La Poile	7,793	+ 11·1	St. Barbe	10,481	+ 28·8
Burin	11,616	+ 11·7	St. George's	11,861	+ 30·3
Carbonear	5,114	+ 1·7	Harbour Main	9,471	– 0·3
Ferryland	5,793	+ 1·8	St. John's East	25,135	+ 16·9
Fogo	8,257	+ 9	St. John's West	20,550	+ 11·3
Fortune Bay	9,989	+ 14	Trinity	21,788	+ 5·2
Harbour Grace	11,925	– 5·9	Twillingate	22,705	+ 16·7
			Tot. for Newf'ndland	238,680	+ 9·9
			Labrador	3,939	+ 0·2
				242,619	

SEX

Newfoundland.	*Males.*	*Females.*	*No. of males per 1,000 females.*
1891	100,775	97,159	1,037
1901	111,311	105,726	1,052
1911	122,253	116,417	1,050

Labrador. In 1911 there were 2,052 males and 1,897 females; that is to say, 1,081 males to each 1,000 females.

IMMIGRATION AND EMIGRATION

For the four years 1903–6, the average number of immigrants, 12,430, exceeded the average number of emigrants, 11,305, by 1,125, but for the period 1907–11 the emigrants, averaging 10,566 per annum, exceeded the immigrants, 9,032, by 1,534 per annum, a result largely brought about by the total of immigrants in 1909 falling to 793. (1912, immigrants, 11,912, emigrants, 9,179.)

VITAL STATISTICS

During the period 1906–10 the birth rate per 1,000 of the estimated mean population averaged 29·47 (1910, 29·79), the marriage rate 7·54 (1910, 7·57), and the death rate 17·16 (1910, 15·20).

RELIGIOUS CENSUS, 1911

		% of total pop.	*Inc. % since 1901.*
Roman Catholic	81,177	33·4	7·7
Church of England	78,616	32·4	7
Methodist	68,044	28	10·9
Salvation Army	10,139	4·2	53·5
Presbyterian	1,876	0·8	25·3
Congregationalist	1,012	0·4	6·5
Other denominations	1,755	0·8	13·6
	242,619	100	

REVENUE AND EXPENDITURE

Revenue.				Expenditure.			Public Debt.	
Av. of 5 years.	£1,000.	*H.Y.*	£1,000.	£1,000.	*H.Y.*	£1,000.	£1,000.
1897–1901	373	1900	434	388	1901	416	3,488
1902–6	504	1906	547	486	1906	533	4,274
1907–11	631	1911	725	610	1911	689	4,847[1]

[1] Public Debt in 1911, £5,586,000.

The chief item of revenue is furnished by the customs, that in the period 1907–11 averaged £530,000, and in 1911 amounted to £596,000. The Post and Telegraph Department, averaging £32,000 (£40,500 in 1911), and Crown Lands, averaging £28,000 (1911, £39,450), are next in order of importance. The chief items of expenditure comprise interest on Public Debt, Sinking Fund, &c., £210,000, the Post and Telegraph Department £115,000, Education £75,000, and Public Charities £66,000.

SAVINGS BANK (GOVERNMENT)

Average of 5 years.	*Number of Depositors.*	*Amount Deposited.* £1,000.	*Amount Withdrawn.* £1,000.	*Standing to credit of depositors at end of year (including interest)* £1,000.
1897–1901	3,640	72·0	74·8	252
1902–6	5,393	108·9	69·5	370
1907–11	7,457	140·6	106·6	555

AREA AND POPULATION

		Population.						
	Area. sq. m.	1881. 1,000.	1,000.	1,000.	1911.	Inc. or dec. % in period 1901–11.	Males per 1,000 females.	Pop. per sq. m.
Bahamas	4,404	43·5	47·6	53·7	55,944	+ 3·9	806	12·7
Turks and Caicos Is.	166	4·7	4·7	5·3	5,615	+ 6·2	805	33·8
Jamaica	4,207	581	639	756	831,383	+10	915	197·6
Cayman Is.	89	—	4·3	·5	5·5	+11·3	773	62·5
St. Lucia	233	38·5	42·2	49·9	48,637	− 2·5	850	208·7
St. Vincent	140	40·5	41	47·5	41,877	−11·94	779	299·1
Barbados	166	172	183	195	171,982	−12·1	690	1,036
Grenada, &c.	133	42·4	53·2	64·4	66,750	+ 5·2	836·2	501·9
Leeward Islands:								
Antigua	108	34·9	36·12	34·18	32,265	− 7·68	765	189·8
Barbuda	62		·58	·77				
St. Kitts	65	29·1	30·87	29·78	26,283	−11·8	716	404·4
Nevis	50	11·8	13·08	12·77	12,945	+ 1·4	744	258·9
Anguilla	35	3·2	3·70	3·89	4,075	+ 4·7	621	116·4
Montserrat	32	10	11·76	12·21	12,316	− 0·15	771	379
Redonda	½		·12	·12				
Dominica	305	28·2	26·84	28·89	33,863	+17·1	817	111
Virgin Islands	58	5·3	4·64	4·91	5,557	+13·2	884	95·8
Total Leeward Is.	715½	122·5	127·71	127·52	127,184	− ·27	765	177·8
Trinidad	1,754	153	200	255·1	333,552	+21·7	1,095	179·2
Tobago	114	18	18·3	18·75				
Bermuda	19	13·9	15	17·5	18,994	+ 8·3	914	999·7
British Honduras	8,598	27·4	31·5	37·5	40,458	+ 7·9	1,015	4·7
British Guiana	90,500	252	270	294	296,041	+ 0·7	1,080	3·3
Falkland Is., &c.	6,500	1·5	1·8	2	2,272	+11·3	2,620	0·4
South Georgia	1,000	—	—	—	1,003	—		

AGRICULTURE

Jamaica.—Av. area cultivated, 1909–11, 888,400 acres. Av. area under: Guinea grass and pasture, 631,000 ac.; ground provisions, 97,500 ac. Bananas, 69,400 ac. (av. exp. 15,770,000 bunches). Sugar-cane, 30,000 ac. (av. exp. 333,000 cwt.). Coffee, 25,000 ac. (av. exp. 73,300 cwt.). Coco-nuts, 14,000 ac. (av. exp. 17·3 mill.). Cacao, 10,500 ac. (av. exp. 49,000 cwt.). Av. no. of oranges exp., 41 mill. Tobacco: av. area, 816 ac., product (1911) 494,600 lb.

St. Lucia.—Area under cacao, 6,000 ac. Exports, av., 1907–11, 1,791,000 lb. Sugar, 3,000 ac., av. exp. 102,400 cwt.

St. Vincent.—Area under cotton, approx., 3,600 ac., av. exp. ('07–11), 452,000 lb. Cacao, 1,000 ac., av. exp. ('07–11), 242,000 lb. Sugar, av. exp., ('07–11); 5,800 cwt.

Barbados.—Area cultivated, 74,000 ac. Sugar, av. '07–11, 34,000 ac. Av. prod., 639,000 cwt. Av. exp. 633,000 cwt. Cotton (av. '07–11), 5,300 ac. Av. prod., 800,000 lb. Av. value of exp., £53,000.

Grenada.—Av. cotton exp. (1907–11), 277,400 lb. (£7,700). Av. cacao exp. (1907–11), 11,898,000 lb.

Leeward Is.—Cacao, av. exp. (1907–11), 1,203,000 lb. Sugar, Virgin Is., 200 ac. St. Kitts, Nevis, av. 1907–11, 15,700 ac.; av. prod., 259,800 cwt. Montserrat, av. area, 550 ac.; av. prod., 3,560 cwt. Antigua, av. area, 15,870 ac.; av. prod., 256,730 cwt. Dominica, 550 ac. Cotton, av. area, 7,100 ac.; av. prod., 1,015,000 lb.; av. value of exp., £67,300.

Tobago and Trinidad.—Area under cacao (av. '07–11), 266,000 ac.; av. exp., 52,058,000 lb. Sugar-cane (av. '07–11), 61,000 ac.; av. prod., 1,023,000 cwt. Coco-nuts (av. '08–10), 17,900 ac.; av. value of exp., £67,000. Rice (av. '08–10), 10,300 ac. Coffee, 4,000 ac.

Bermuda.—Census 1911: area under tillage 2,761 ac.; wood or natural pasture, [illegible],729 ac.; cult. grasses 68 ac.; marsh 177 ac. Prin. crops (year ending 31/3/1911): potatoes, 35,000 brls; onions, 142,900 crates; sweet potatoes, 8,777,000 lb. Arrowroot, 26,190,000 lb.: celery, 45,760 boxes; parsley, 39,660 boxes; lily bulbs (large), 1·07 mill., (small) 3·6 mill.

Brit. Honduras.—Cacao, av. exp., '07–11, 34,000 lb.; coffee, 10 ac. (25,000 trees); sugar, av. area, 935 ac., av. prod., 12,000 cwt.; rubber, av. exp. '07–11, 20,400 lb. (£1,360).

Brit. Guiana.—Cacao, av. 1907–11, 2,127 ac., av. exp. 73,000 lb.; coffee, av. '07–11, 1,823 ac., av. exp. 86,000 lb.; sugar, av. '07–11, 73,000 ac., av. exp. 2,099,200 lb.; rubber, av. '07–11, production, 1,080,000 lb., av. value £122,000; coco-nuts, av. area '09–11, 9,180 ac.; rice, av. area, 35,300 ac.

SHIPPING

TOTAL NET TONNAGE OF VESSELS ENTERED AND CLEARED (EXCLUSIVE OF COASTING TRADE)

		Total net tonnage.	*Highest*		*Av. tonnage of British vessels.*	
	Av. of years.	1,000 *tons.*	*year.*	1,000 *tons.*	1,000 *tons.*	% *of total.*
BAHAMAS:	1897–1901	873	1900	1,114	368	42·1
	1902–6	1,244	1906	1,724	240	19·2
	1907–11	1,606	1907	1,929	175	10·8
TURKS AND CAICOS ISLANDS:	1897–1901	281	1897	328	74·76	26·6
	1902–6	330	1906	358	81·12	24·5
	1907–11	383	1909	433	100·4	26·2
JAMAICA:	1897–1901	1,783	1901	1,992	1,061	59·5
	1902–6	2,527	1906	3,026	1,003	39·6
	1907–11	3,459	1911	4,319	1,393	40·2
ST. LUCIA:	1897–1901	1,664	1901	1,864	1,406	84·4
	1902–6	1,646	1906	2,135	1,400	85
	1907–11	2,846	1911	3,996	2,444	85·8
ST. VINCENT:	1897–1901	280	1901	361	271	96·7
	1902–6	398	1904	498	394	99
	1907–11	312	1908	340	294	94·2
BARBADOS:	1897–1901	1,351	1901	1,476	1,246	92·2
	1902–6	1,592	1906	1,763	1,462	91·8
	1907–11	2,623	1911	3,475	2,088	79·6
GRENADA:	1897–1901	465	1901	543	443	95·2
	1902–6	602	1905	639	592	98·3
	1907–11	558	1910	590	547	96·2
CAYMAN IS.	1911–12	40	1912	45	30·6	76·5
LEEWARD ISLANDS*:	1897–1901	1,654	1901	1,796	1,590	96·1
	1902–6	2,017	1905	2,172	1,936	95·9
	1907–11	2,314	1908	2,507	2,131	92·9
TOBAGO AND TRINIDAD:	1897–1901	1,254	1897	1,341	726	57·89
	1902–6	1,857	1904	2,018	1,247	67·14
	1907–11	2,524	1911	3.658	1,579	62·5
BERMUDA:	1897–1901	610	1901	934	496	81·3
	1902–6	636	1902	716	552	86·7
	1907–11	1,043	1911	1,403	867	83·1
BRITISH HONDURAS:	1897–1901	378	1901	415	157	41·54
	1902–6	475	1904	503	292	61·48
	1907–11	658	1910	979	329	50
BRITISH GUIANA:	1897–1901	672	1901	726	436	64·86
	1902–6	784	1904	866	553	70·53
	1907–11	928	1910	1,066	618	66·61
FALKLAND ISLANDS:	1897–1901	147·4	1901	194	69	46·8
	1902–6	237·4	1906	278	227·6	95·9
	1907–11	317·4	1911	350·7	286	90·1

* Including Inter-Presidency Shipping.

Principal Ports (1908–10).—JAMAICA, Kingston, average tonnage 1,934,000 (58·32 % of total net tonnage); Port Antonio, 852,000 (25·68 %). LEEWARD ISLANDS: Roseau (Dominica), 710,000 tons (29·71 %); St. John's (Antigua), 671,000 tons (28·07 %); Basseterre (St. Kitts), 544,000 tons (22·76 %). TRINIDAD, Port of Spain, 2,305,000 tons (96·56 %). BERMUDA: Hamilton, 790,000 tons (79·47 %); St. George, 204,000 tons (20·52 %). BRITISH HONDURAS: Belize, 724,000 tons (99·45 %). BRITISH GUIANA: Georgetown (Demerara), 939,000 tons (98·4 %).

LIVE STOCK

	Horses.	*Horned Cattle.*	*Sheep.*	*Pigs.*
Bahamas (av. 1909–11) . . .	1,091	1,578	10,900	—
Turks and Caicos (av. 1907–11) . .	97	634	145	—
Jamaica (av. 1908–10) . . .	52,590	108,000	13,000	31,000
Barbados (av. 1907–11) . . .	2,466	—	—	—
Grenada (census 1911) . . .	1,493	5,101	—	—
Tobago and Trinidad (av. 1908–11) .	4,445	12,500	2,300	9,000
British Guiana (av. 1908–10) . .	1,886	73,200	17,600	14,200
Falkland Isl. (av. 1907–11) . .	3,299	5,700	706,400	78

MINERALS

Bahamas.—Salt, av. product, 1906–10, 1,251 tons. Val. £380.

Turks and Caicos Is.—Salt, av. exp., 1907–11, 39,600 tons. Val. £16,200.

Barbados.—'Manjak' (pitch), av. exp., 1907–11, 360 tons. Val. £3,320.

Trinidad and Tobago.—Asphalt, av. product, 1906–10, 140,000 tons. Val. £113,000. Limestone, av. value, £6,900. 'Manjak,' av. value, £3,760. In the year 1910–11 4·4 mill. gals. of petroleum were produced.

British Guiana.—Gold, av. 1907–11, product. 62,191 oz. Av. val. £226,000. Diamonds, av. exp. 1907–11, 4,800 carats. Val. £7,760.

RAILWAYS

Jamaica.—Length of line open, 185 m.; av. receipts, 1897–1901, £112,000; 1902–6, £133,000; 1907–11, £162,000; highest year, 1911, £190,000; av. working expend., 1897–1901, £87,000; 1902–6, £84,000; 1907–11, £103,000, i. e. 63 % of receipts; highest year, 1909, £110,600.

Barbados.—Length, 28 m.; av. receipts (1907–11), exclu. of Govt. subs. of £2,000, £6,600; av. working expend., £8,470.

Antigua.—Two private lines, narrow gauge, 16 and 3½ m. in length respectively.

Trinidad.—Length, 81 m.; cost of construction per m. £11,485; av. receipts, 1907–11, including railway and telegraph rec., £105,600; working expend., £64,400 or 61 % of receipts.

British Honduras.—Length, 25 m.; av. receipts since opening, 1908, £2,829 (1911–12, £3,116); working expenses, £5,972 (1911–12, £6,693).

British Guiana.—Length, 95 m.; av. receipts (1907–11), exclu. particulars of a private line 19 m. in length, £51,000; working expend. £34,000, i. e. 66 % of receipts.

IMPORTS AND EXPORTS

AVERAGE OF PERIODS: (1) 1897–1901; (2) 1902–6; (3) 1907–11

	IMPORTS.					EXPORTS.				
				Av. Imports. From the					*Av. Exports. To the*	
Period.	*Total.* £1,000.	*Highest Year.*	£1,000.	*U. K.* £1,000.	*% of total.*	*Total.* £1,000.	*Highest Year.*	£1,000.	*U. K.* £1,000.	*% of total.*
BAHAMAS:										
1	283	'00	335	62·7	22·1	175	'00	207	21·8	12·4
2	307	'06	329	65·7	21	212	'05	223	16	7·5
3	345	'07	373	88·6	25·6	199	'07	238	26·9	13·5
TURKS AND CAICOS ISLANDS:										
1	29·3	'97	33·2	3·2	10·9	35·3	'97	43·3	·22	·6
2	28·6	'02	32·3	4	14	27·6	'02	32·5	1·10	3·9
3	25·96	'10	27·9	4·84	18·6	23·1	'08	24·8	·29	1·2
JAMAICA:										
1	1,759·6	'99	1,844	828	47	1,741	'01	1,939	351	20·1
2	1,985·6	'06	2,261	968	48·7	1,821	'02	2,292	355	19·4
3	2,675	'07	2,914	1,183	44·2	2,558	'11	2,948	504	19·7

	Imports.					Exports.				
Period.	*Total.* £1,000.	*Highest Year.*	£1,000.	*Av. Im. from the U.K.* £1,000.	*% of total.*	*Total.* £1,000.	*Highest Year.*	£1,000.	*Av. Ex. to the U.K.* £1,000.	*% of total.*
St. Lucia (*including imports of bunker coal, Exports exclude value of bunker coal exported*) :										
1	317·4	'00	403	166·6	52·4	105·8	'97	154	25	23·6
2	303·2	'04	370	168	55·4	100·8	'06	114·6	51·4	51
3	292·4	'11	318	84	28·7	129·4	'08	150·4	71·4	55·1
St. Vincent :										
1	87·4	'99	103·7	30·4	35·9	60	'00	100	30·6	51
2	75·6	'02	79·1	27·4	36·2	54	'06	83·7	25·4	47
3	99·7	'08	113·7	39·7	39·8	98·7	'11	114·7	58	58·75
Barbados (*Exports exclude bunker coal*) :										
1	1,022·5	'98	1,059	447	43·7	844	'01	950	51	6·0
2	999·7	'06	1,192	430	43	763	'05	936	114	14·9
3	1,300·3	'11	1,539·7	545	41·9	896	'10	1,004	124	13·8
Grenada :										
1	214	'06	246	99	46·2	259	'00	312	218	84·1
2	235	'04	252	104	44·2	282	'02	310	196	69·5
3	285	'11	308	132	46·3	323	'07	417	193	59·73
Leeward Islands (*including Inter-Presidency Trade*) :										
1	350	'01	376	143	40·8	327	'99	373	59	18
2	408	'06	424	173	42·4	367	'05	423	98	26·7
3	570	'11	713	241	42·2	526	'11	566	186	35·3
Trinidad and Tobago (*including transhipments*) : *Imports for consumption* :										
1	2,431	'01	2,652	888	36·53	2,387	'00	2,584	803	33·59
2	2,850	'05	3,304	949	33·31	2,653	'05	3,168	715	26·96
3	3,542	'11	5,019[1]	1,073	30·27	3,572	'11	4,769[1]	757	21·19

In connexion with the above statistics it should be noted that 'transhipments' averaged £493,000 (1897–1901), £488,000 (1902–6), and £1,000,000 (1907–11).

Bermuda :										
1	398	'01	526	164[2]	41	113	'97	127·7	3·5	3
2	547	'04	632	273[2]	50	145	'06	161·4	10	6·8
3	463	'11	545	130	28	134	'09	184	3·1	2·3
British Honduras :										
1	252	'97	292	81	32·1	274	'97	289	154	56·1
2	363	'06	452	96	26·4	367	'06	415	91[3]	24·79
3	555	'11	593	129	23·24	479	'11	552	80	16·7
British Guiana :										
1[4]	1,315	'98	1,371	725	55·13	1,837	'00	1,982	886	48·22
2	1,533	'06	1,634	833	54·34	1,829	'04	1,932	773	42·27
3	1,797	'08	1,778	886	51·89	1,883	'11	2,084	771	40·95
Falkland Islands :										
1	70·4	'01	74·8	63	89·48	118·6	'99	139	115·4	97·27
2	69·8	'03	111·4	54	77·36	146	'06	185	145·4	99·59
3	87	'09	98·9	78	89·66	286·6	'11	471[5]	211·4	73·75

Cayman Is. Av. 1908–12 Imp. £24,700 (1912, £28,400), Exp. £11,600 (1912, £12,300).

[1] Transhipments this year £2,263,500.

[2] Includes government stores, 1901–2–3.

[3] Between 1900 and 1902 the exports to the United States were more than doubled, with a consequent falling away in exports to the United Kingdom.

[4] Includes transhipments in years prior to 1900–1.

[5] A note to the official statistics states that this sum is exclusive of exports from South Georgia, valued at £426,438.

TRADE WITH PRINCIPAL COUNTRIES (see note on p. 480)

AVERAGE IMPORTS AND EXPORTS IN £1,000, PERCENTAGE OF TOTAL, HIGHEST YEAR IN £1,000

(Imports are credited to the countries from which they were received directly; exports to the 'Countries to which they were exported', unless otherwise stated.)

	U.K.	*Canada.*	*B.W.Ind.*	*Total British Empire.*	*U.S.A.*	*France.*	*Germany.*	*Total Foreign Countries.*	*Grand Total.*
Bahamas: av. 1908–10.									
Av. imp. from .	89	10	—	105	234	—	—	242	347
% of total .	25·65	2·88	—	30·26	67·44	—	—	69·74	100
Av. exp. to .	25	—	—	27	110	—	17	156	183
% of total .	13·65	—	—	14·75	60·10	—	9·28	85·25	100
Turks and Caicos Is.: av. 1908–10.									
Av. imp. from .	5·1	3·7	—	10·8	13·3	—	—	15·1	25·9
% of total. .	19·69	14·29	—	41·7	51·36	—	—	58·3	100
Av. exp. to .	0·45	2·3	—	3·76	17·2	—	—	18·94	22·7
% of total .	1·98	10·14	—	16·56	75·77	—	—	83·44	100
Jamaica: av. 1907–11. Imp. 'Countries whence assigned.'									
Av. imp. from .	1,183	192·6	—	1,409	1,189	—	53	1,266	2,675
% of total .	44·2	7·2	—	52·6	44·4	—	2	47·4	100
H. Y. 1907 .	1,382	162	—	1,580	1,268	—	46	1,334	2,914
Av. exp. to .	504	164	42	726	1,509	126	65	1,832	2,558
% of total .	19·7	6·4	1·64	28·4	58·98	4·92	2·54	71·6	100
H. Y. 1911 .	434	253	37	753	1,826	112	89	2,195	2,948
St. Lucia: av. 1909–11.									
Av. imp. from .	72·3	—	—	103	162·3	—	—	184	287
% of total .	25·2	—	—	35·9	56·5	—	—	64·1	100
Av. exp. to .	77·5	—	—	96	—	26·3	—	30	126
% of total .	61·5	—	—	76·2	—	20·9	—	23·8	100
St. Vincent: av. 1908-9–1910-11.									
Av. imp. from .	39·9	—	—	75·6	17·3	—	—	21·3	96·9
% of total .	41·18	—	—	78·02	17·85	—	—	21·98	100
Av. exp. to .	61·2	—	—	100·5	—	—	—	2·3	102·8
% of total .	59·55	—	—	97·78	—	—	—	2·22	100

Barbados: av. 1907–11.

Imp. classified accord. to 'Countries of origin' in 1911, 'Countries whence imported' previous years.
Exp. class. 'Countries of ultimate destination' in 1911, 'Countries to which exported' previous years.

Av. imp. from	545·6	145·1	59·5	827·1	611·3	—	—	473·2	1,300·3
% of total	41·96	11·16	4·58	63·62	31·64	—	—	36·38	100
H. Y. 1911	599·4	188·3	76	997·2	428	—	—	542·5	1,539·7
Av. exp. to	124	363	45	717	107	—	—	180	973 *
% of total	12·75	37·31	14·9	73·69	11	—	—	18·49	100 *
H. Y. 1910	129·2	484·8	143·5	837·8	94·8	—	—	166·4	1,088·8 *

Grenada: av. 1908–10.

Av. imp. from	132	17	—	201	76	—	—	83	284
% of total	46·48	5·98	—	70·78	27·38	—	—	29·22	100
Av. exp. to	207	—	—	213·8	35	62	—	98·2	312
% of total	66·34	—	—	68·53	11·21	19·87	—	31·47	100

Leeward Is.: av. 1908–10.

Av. imp. from	213	44 †	—	327·5	194	—	—	212·5	540
% of total	39·45	8·15	—	60·65	35·92	—	—	39·35	100
Av. exp. to	165	228 †	—	430	58	—	—	82	512
% of total	32·22	44·52	—	83·99	11·33	—	—	16·01	100

Tobago and Trinidad: av. 1907–11.

Imp. class. accord. to 'Countries whence imported.'

Av. imp. from	1,073·4	135†	57	1,483	868	84	86	2,059	3,542
% of total	30·27	3·81	1·61	41·86	24·51	2·37	2·43	58·14	100
H. Y. 1911	1,419	190†	147	2,235	1,034	96	149	2,784	5,019
Av. exp. to	757	291†	59	1,170	1,051	604	229	2,402	3,572
% of total	21·19	8·15	1·65	32·75	29·41	16·91	6·41	67·25	100
H. Y. 1911	1,129	244†	168	1,783	1,271	349	502	2,986	4,769

Bermuda: av. 1906–10.

Av. imp. from	122·6	74	—	203	228·4	—	—	230·7	433·7
% of total	28·21	17·02	—	46·91	52·55	—	—	53·09	100
H. Y. 1910	158	83·4	—	249	267	—	—	268	517
Av. exp. to	8·8	2·56	—	13·8	125	—	—	125·7	139·5
% of total	6·31	1·84	—	9·9	89·6	—	—	90·1	100
H. Y. 1909	3·4	2·9	—	8·4	175·4	—	—	175·4	183·8

* Includes bunker coal not allocated. † British North America.

TRADE WITH PRINCIPAL COUNTRIES (*continued*)

AVERAGE IMPORTS AND EXPORTS IN £1,000, PERCENTAGE OF TOTAL, HIGHEST YEAR IN £1,000.

	U.K.	*Canada.*	*B.W.Ind.*	*Total British Empire.*	*U.S.A.*	*France.*	*Germany.*	*Total Foreign Countries.*	*Grand Total.*
British Honduras : av. 1907–11.									
Imp. class. accord. to 'Countries whence consigned' from June 1909, previous years 'Countries whence imported.'									
Av. imp. from .	129	—	—	132	254	—	—	423	555
% of total .	23·24	—	—	23·78	45·76	—	—	66·22	100
H. Y. 1911 .	127·6	—	—	132·7	262·7	—	—	460·7	593·4
Av. exp. to .	80	—	—	81	306	—	—	398	479
% of total .	16·7	—	—	16·91	63·89	—	—	83·09	100
H. Y. 1911 .	68·96	—	—	68·96	394·87	—	—	483·13	552·09
British Guiana : av. 1907–11.									
Imp. class. accord. to 'Countries of origin' from Oct. 1908, previously 'Countries whence imported.'									
Av. imp. from .	886	132	29	1,102	476	22	—	605	1,707
% of total .	51·89	7·73	1·67	64·55	27·89	1·29	—	35·45	100
H. Y. 1908 .	977	126	42	1,173	524	15	—	605	1,778
Av. exp. to .	771	748	70	1,592	216	—	—	291	1,883
% of total .	40·95	39·72	3·71	84·54	11·48	—	—	15·46	100
H. Y. 1911 .	713	875	59	1,649	362	—	—	434	2,083
Falkland Islands : av. 1907–11.									
Av. imp. from .	78	—	—	78	—	—	—	9·1	87·1
% of total .	89·66	—	—	89·66	—	—	—	10·34	100
Av. exp. to .	211·4	—	—	211·4	—	—	—	75·2	286·6
% of total .	73·75	—	—	73·75	—	—	—	26·25	100

PRINCIPAL ARTICLES IMPORTED AND EXPORTED

Bahamas (av. 1908–10). **Imports: cotton, woollen, linen, and silk goods, £53,000 (15·28 % of total imp.); flour, £46,000 (13·26 %); earthenware and glass, £35,000 (10·09 %). Exports: sponge, £98,000 (53·55 %); Bahamas hemp, £44,000 (24·04 %).**

Turks and Caicos Is. (av. 1908–10). **Imports: flour, £2,400 (9·26 % of total imp.); cotton goods, £2,900 (11·19 %). Exports: salt, £16,900 (74·46 %); sisal grass, £3,200 (14·09 %).**

Jamaica (av. 1906–11).

Imports.	£1,000.	% of total.	H.Y. 1907–8. £1,000.	Exports.	£1,000.	% of total.	H.Y. 1911. £1,000.
1. Cotton Manuf.	359	13·7	411·2	1. Bananas	1,161	47·15	1,456·6
2. Flour, wheat	236	9	248·4	2. Spirits; rum	158·5	6·43	85·9
3. Fish	185·6	7·1	172·6	3. Sugar	155·6	6·32	247·4
4. Wood and timber	125·8	4·7	144·7	4. Coffee	132	5·36	154·1
5. Grain: rice and maize	104	3·9	118	5. Logwood Extract	125	5·07	166
6. Boots and Shoes	81·3	3·1	94·2	6. Cacao	104·5	4·24	101·4
7. Apparel	80·5	3	109·8	7. Specie: gold	97	3·94	111·7
8. Machinery	70·3	2·6	83·5	8. Pimento	69·6	2·82	83·2
				9. Logwood	68	2·76	99·1
				10. Coco-nuts	63·5	2·57	98·7
				11. Oranges	53	2·15	47

Tobago and Trinidad (av. 1907–11. H. Y. 1911).

1. Apparel	486	13·72	590	1. Cacao	1,514	42·38	1,393
2. Hardware & machinery	265	7·48	413	2. Sugar	576	16·13	570
3. Balata gum	248	7	476	3. Balata gum	248	6·94	477
4. Flour	224	6·32	232	4. Asphalt	170	4·76	195
5. Cacao	220	6·21	239	5. Apparel	118	3·30	224
6. Rice	127	3·58	150	6. Hides and skins	117	3·27	178
7. Hides and skins	107	3·02	160	7. Bullion: gold	106	2·97	285
8. Bullion: gold	104	2·93	282				
9. Meat of, all kinds	95	2·68	81				

St. Lucia (av. 1908–10). Imports: coal, £106,000 (38·14 %); cotton manuf., £25,000 (9 %); flour, £21,000 (6 %); fish, preserved, £9,300 (3·3 %). Exports: sugar, £60,000 (44·13 %); cacao, £42,000 (31·53 %).

St. Vincent (av. 1908–10). Imports: textiles, £23,000 (23·5 %); flour, £10,300 (10·53 %). Exports: arrowroot, £30,000 (31·58 %); raw cotton, £29,660 (31·23 %).

Barbados (av. 1907–11). Imports: textiles, £207,000 (15·9 %); flour, £85,000 (6·5 %); lumber, &c., £80,200 (6·2 %); manures, £80,000 (6·1 %); coal, coke, £77,000 (5·9 %); rice, £68,600 (5·2 %); meat, £56,000 (4·3 %); fish, £51,600 (4 %). Exports: molasses, £291,000 (29·9 %); sugar, £278,200 (28·5 %); coal, 77,200 (7·9 %); raw cotton, £53,000 (5·4 %).

Grenada (av. 1908–10). Imports: flour, £35,000 (12·32 %); cotton manuf., £24,000 (8·45 %); apparel, £14,000 (4·9 %), other textiles, £22,000 (7·75 %); fish, £14,000 (4·9 %); wood and timber, £14,000 (4·9 %). Exports: cacao, £273,000 (87·5 %); spices, £19,000 (6·09 %).

Leeward Islands (av. 1908–10). **Imports: cotton, linen, &c., manuf., £65,000 (12·06 %); flour, £64,000 (11·85 %); haberdashery, £35,000 (6·48 %); hardware and cutlery, £26,000 (4·8 %); fish, £25,000 (4·63 %). Exports: sugar, £241,000 (47·07 %); limes and lime-juice, £55,000 (10·74 %); raw cotton, £53,000 (10·35 %); molasses, £31,000 (6·05 %).**

Bermuda (av. 1906–10). Imports: provisions, £30,800 (7 %); flour and meal, £21,800 (5 %); cotton goods, £21,200 (4·8 %); apparel, £20,300 (4·6 %); live stock, £19,800 (4·5 %); butter, £16,200 (3·7 %). Exports: onions, £42,600 (30·6 %); specie, £31,400 (22·6 %); potatoes, £29,100 (20·9 %); other vegetables, £10,800 (7·7 %); lily bulbs, £7,100 (5·1 %).

British Honduras (av. 1907–11). Imports: wood and timber, £68,000 (12·23 %); sapodilla gum, £65,000 (11·69 %); cotton goods, £56,000 (10·07 %). Exports: sapodilla gum, £151,000 (30·89 %); mahogany, £145,000 (29·66 %); bananas, £23,000 (4·7 %); coco-nuts, £21,000 (4·3 %); logwood, £19,000 (3·88 %).

British Guiana (av. 1907–11). Imports: cotton manuf., £192,000 (11·26 %); flour, £191,000 (11·19 %); manures, £152,000 (8·9 %); machinery, £76,000 (4·45 %); haberdashery, £57,000 (3·34 %). Exports: sugar, £1,177,000 (62·5 %); bullion and specie, £274,000 (14·55 %); rum, £124,000 (6·58 %); Balata gum, £113,000 (6 %).

Falkland Is. (av. 1908–10). Imports: groceries, £19,600 (22·1 %); hardware, £11,800 (13·3 %). Exports: wool, £137,000 (57·55 %); whale oil, £74,000 (31·09 %).

FINANCE

	REVENUE.					EXPENDITURE.		
Average of five years.	*Total Revenue.* £1,000.	*H.Y.*	£1,000.	*Average Customs* £1,000.	*% of total.*	*Total Expenditure.* £1,000.	*H.Y.*	£1,000
BAHAMAS: Public Debt (1907–11), £99,000 (1912, £47,000).								
1897–1901	76·8	1898	86·7	63·1	82·3	72·9	1900	82·8
1902–6	74·26	1906	79	61·7	83	72·3	1902	74·6
1907–11	83·84	1907	89·7	69·1	82·4	88	1908	99·6
TURKS AND CAICOS ISLANDS: Public Debt, Nil.								
1897–1901	8·6	1897	9·5	5·94	69	8	1897	8·4
1902–6	7·4	1902	8·7	5·28	71·3	7·86	1903	8·9
1907–11	7·9	1910	8·6	5·34	67·6	7·12	1911	7·7
JAMAICA: Public Debt (1907–11), £3,860,000.								
1897–1901	806	1901	916	329	40·8	801	1900	906
1902–6	1,005	1903	1,076	386	38·4	919	1903	942
1907–11	1,191	1911	1,352	475	39·8	1,128	1911	1,266
ST. LUCIA: Public Debt (1907–11), £149,000.								
1897–1901	68	1900	72·1	33·2	48·6	63	1901	67·5
1902–6	65	1904	69·3	29·4	45·2	65	1903	70·7
1907–11	67	1911	72	32·8	48·9	66	1911	69·3
ST. VINCENT: Public Debt (1907–11), £2,050 (1912, £50).								
1897–1901	34·6	1899	63	13·6	39·3	33·4	1899	47·9
1902–6	27·6	1902	29	11·6	42	26·8	1902	28·4
1907–11	35·6	1911	34·8	13·56	38	29·4	1911	33·7
BARBADOS: Public Debt (1907–11), £415,700.								
1897–1901	181·7	1900	185·5	98·14	54	183·3	1899	207·9
1902–6	185·1	1906	204·7	102·3	55·2	183·2	1902	194·3
1907–11	206·1	1911	221·9	113·3	54·9	202·9	1911	215·7
GRENADA: Public Debt (1907–11), £123,800.								
1897–1901	65·8	1900	70·4	34·2	51·9	64	1901	65·5
1902–6	70·6	1902	72·8	35·4	50·1	70	1905	71·9
1907–11	80·8	1911	98·6	42	51·9	74	1911	81
CAYMAN ISLANDS: Public Debt, nil.								
1908–12	3·5	1908	4·57	1·5	42·8	3	1909	3·7

FINANCE

	REVENUE.					EXPENDITURE.		
Average of five years.	*Total Revenue.* £1,000.	*H.Y.*	£1,000.	*Average Customs* £1,000.	*% of total.*	*Total Expenditure.* £1,000.	*H.Y.*	£1,000.
LEEWARD ISLANDS: Public Debt (1907–11), £270,800.								
1897–1901	120	1897	124·7	65	54·1	136·6	1899	142
1902–6	131	1906	138·1	71	54·2	133·8	1903	138
1907–11	159	1911	174·8	93	58·4	149·2	1910	159
TOBAGO AND TRINIDAD: Public Debt (1907–11), £1,055,500.								
1897–1901	667	1901	712	290	43·48	668	1901	731
1902–6	803	1905	848	332	41·34	809	1905	870
1907–11	892	1911	95[illegible]	392	43·94	877	1911	959
BERMUDA: Public Debt (1907–11), £45,700.								
1897–1901	40·8	1901	49·4	32·6	79·9	38	1900	43·7
1902–6	54·8	1904	60·9	45	82·1	56·8	1906	63·7
1907–11	68·6	1911	79	57·4	83·6	66·7	1911	90·1
BRITISH HONDURAS: Public Debt (1907–11), £70,000; 1911, £105,000.								
1897–1901	58	1897	64	32	55		1897	65
1902–6	65	1906	80	34	52·3	58	1906	65
1907–11	86·7	1911	102	49	56·7	80	1911	100·7
BRITISH GUIANA: Public Debt (1907–11), £891,000.								
1897–1901	514	1899	531	303	58·93	528	1897	564
1902–6	529	1902	540	325	61·44	512	1903	530
1907–11	556	1911	586	321	58·3	547	1911	588
FALKLAND ISLANDS: Public Debt: Nil.								
1897–1901	14	1900	15·6	4·3	30·72		1901	17·6
1902–6	16	1903	17·4	4·98	31·13	14·8	1906	15·7
1907–11	19	1911	24·2	5·3	27·89	18·8	1911	22·5

H. Y. signifies highest year, i.e. the year in which highest returns were recorded during periods for which averages are given.

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